NETWORK WORLD

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3Com moves to open net product line

By Susan Breidenbach
West Coast Bureau Chief

SANTA CLARA, Calif. — 3Com Corp. continued to broaden its interoperability horizons last week by introducing additional support for Novell, Inc.'s industry-leading NetWare network operating system and announcing a strategic alliance with SynOptics Communications, Inc.

Beginning early next year, 3Com's 3Server line of high-performance network file servers will be able to run NetWare 386. This capability — which 3Com will be demonstrating at NetWorld '90 in Dallas next week — represents the first time the 3Server has supported anything but 3Com's own 3+ or 3+Open LAN Manager.

The alliance with SynOptics brings the leading Ethernet board manufacturer and the foremost supplier of intelligent LAN wiring hubs together in a powerful partnership that will let the companies leverage each other's largely complementary market dominance and technology.

The two announcements demonstrate a newfound pragmatism at 3Com that has swept aside the not-invented-here syndrome that seemed to permeate the company in recent years.

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PHOTO ©1990 GENE MAYLOCK

Television picture tubes on a Corning Asahi assembly line.

Corning Asahi turns the corner thanks to CIM plan

By Wayne Eckerson
Senior Writer

STATE COLLEGE, Pa. — Corning Asahi Video Products Co. has come back from the brink of insolvency thanks to a computer-integrated manufacturing (CIM) program that has helped the firm regain profitability despite increasing global competition.

Since 1985, Corning Asahi has implemented an integrated factorywide network architecture that has enabled the company to reduce manufacturing costs by 22%, triple manufacturing output and increase the number of defect-free parts by as much as 26%.

As a result, Corning Asahi, based here, is now making money instead of losing it and is moving toward achieving its goal of becoming a world-class provider of low-cost, high-quality glass television picture tubes, according to Plant Manager Mark Mitchell.

"Clearly, we wouldn't be in business if we hadn't done something major. We can now match our Japanese, West German and French competitors in cost and quality," Mitchell said.

As a testament to its success,

(continued on page 61)

Open systems group rips users, vendors

Report from 'Houston 30' says users, suppliers lack commitment to implementing open systems.

By Jim Brown and Ellen Messmer
Network World Staff

ANN ARBOR, Mich. — The so-called "Houston 30," a group of information system (IS) and network managers from some of the nation's largest companies, last week issued a report that blasts vendors and users for failing to make open systems a reality.

The report attacked suppliers for not bringing a full range of open systems products to market and for dragging out the open systems development process. It also criticized users for continuing to buy proprietary systems and for adopting a short-term business view that encourages reliance on proprietary products at the expense of open systems deployment.

The group — which was named for the number of companies that attended the organization's last meeting in Houston — was established to identify obstacles to open systems deployment and to speed the adoption of open systems by putting pressure on vendors.

Current members of the Houston 30 include top IS and network executives from companies such as Eastman Kodak Co., E.I. du Pont de Nemours & Co., Exxon Chemical Co., Ford Motor Co., General Electric Co., General Motors Corp. and Hughes Aircraft Co.

In its report, titled "Overcom-

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GOSIP test woes

Aug. 15, 1990

National Institute of Standards and Technology grants only provisional approval to GOSIP abstract test suites due to test inadequacies.

Oct. 1, 1990

Vendor testing systems scheduled to be accredited by NIST, but will only receive provisional approval – again due to inadequacies in underlying abstract test suites.

Nov. 15, 1990

NIST scheduled to release list of accredited GOSIP conformance test labs.

SOURCE: *NETWORK WORLD*
GRAPHIC BY: SUSAN SLATER

NIST falters in GOSIP test development

By Ellen Messmer
Washington Correspondent

GAITHERSBURG, Md. — Even though the Government Open Systems Interconnection Profile (GOSIP) went into effect last month, users have no guarantees that products are fully GOSIP-compliant because testing programs are in disarray.

An official of the National Institute of Standards and Technology (NIST), which oversees the GOSIP conformance test programs, said in recent interviews that initial test systems for GOSIP products may be incomplete or even flawed.

Consequently, NIST is recommending that users get assurances from vendors, through maintenance contracts or otherwise, that GOSIP products will be upgraded as necessary.

"We started late on the testing

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NETLINE

NCR COMTEN SET to roll out low-end front-end processor for SNA networks. Page 2.

TOWERS PERRIN SLASHES net expenses with nationwide fractional T-1 net. Page 2.

INTERACTIVE SYSTEMS introduces Portable NetWare for Unix microcomputers. Page 2.

CPE VENDORS STRIVING to meet user needs for ISDN network management. Page 4.

NETWISE EXTENDS ITS RPC technology for use on IBM mainframes, Macs. Page 4.

T-3 ADVANCES will enable users to monitor circuit performance, conduct tests. Page 4.

WINDOWS CONNECTION 2.0 facilitates data transfer between PCs and host-based applications. Page 61.

NEWSPAPER

FEATURE

Current OSI products need time to mature

By Edwin Mier
Special to Network World

There is a broad selection of Open Systems Interconnection products available today with impressive features. However, initial purchase costs are high, and many unresolved implementation issues and technical bugs remain to be ironed out. Many of today's OSI products are first-generation implementations held together with vendors' "best guess" software glue.

Trends and Technologies: RESHAPING networks:

Nevertheless, these products are sure to evolve rapidly over the next few years as the learning curve for vendors and users peaks and performance and management issues are addressed.

The particular protocols and subprotocols that each vendor has chosen to implement vary considerably at the top of the OSI stack — the application layer, where most

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NCR Comten to add flexible low-end FEP for SNA nets

Comten 5645 is upgradable to the other 56X5 processors, offers more power than IBM devices.

By Paul Desmond
Senior Editor

ST. PAUL, Minn. — NCR Comten is scheduled to announce today a new low-end front-end processor that can function as a remote concentration point in large networks or as a local front end in nets with limited line and host connection requirements.

The Comten 5645 is a new member of the Comten 5600 communications processor line and is intended to compete with IBM's low-end 3745 Models 130, 150 and 170. The base model 5645 is more powerful and offers at least four times the number of token-ring connections and twice the number of T-1 ports as the IBM machines (see chart, page 62).

The 5645 is upgradable to NCR Comten's other 56X5 processors, all the way up to the high-end 5675. By comparison, IBM's 3745 Models 130, 150 and 170 are upgradable from one to another but not to the larger 3745 Models 210 and 410.

"That's an important point because people are frustrated by the fact that they have to get rid of low-end machines to upgrade to the high-end machines," said Mark LaRow, senior manager at Network Strategies, Inc., the network consulting practice of Ernst & Young in Fairfax, Va.

(continued on page 62)

Firm shaves net expenses by 35% with T-1 network

Using savings to pay off nine new T-1 muxes.

By Barton Crockett
Senior Editor

NEW YORK — Towers Perrin, a consulting and accounting firm here, recently completed installation of a nationwide fractional T-1 network that is reducing network expenditures by about 35%.

By using fractional T-1 services from Cable & Wireless Communications, Inc. to replace dedicated 56K bit/sec lines from AT&T, Towers Perrin has reduced its monthly network bills enough to pay off in nine months nine new T-1 multiplexers needed to support the net, according to Deborah Donovan, manager of data communications at the consulting firm.

The new network, completed last April, consists of about 30 point-to-point, 56K bit/sec fractional T-1 circuits radiating out from a corporate mainframe in Philadelphia to eight company offices around the country. The fractional T-1 links replaced about 12 to 15 AT&T point-to-point 56K bit/sec circuits. The interexchange facilities are accessed using full local T-1 links.

Donovan said the capacity of the new network was doubled to support an increased number of 3270 controllers and printers, and to increase throughput and reduce response times.

Extra circuits were also added

(continued on page 63)

Firm adds new versions of NetWare for Unix micros

By Tom Smith
New Products Editor

SANTA MONICA, Calif. — Interactive Systems Corp. last week unveiled two products based on Novell, Inc.'s Portable NetWare that enable Unix microcomputers to function as servers and clients in NetWare local-area networks.

The packages, Interactive Ported NetWare for servers and Interactive Ported Client NetWare for NetWare clients, enable users to leverage the multitasking capabilities of Unix and the file and print services of NetWare.

Several other vendors have introduced Portable NetWare on Unix platforms, but Interactive is the first to offer a client version that allows Unix workstations to access a DOS-based NetWare server for print services and electronic mail, according to Kevin Haley, networking product manager for Interactive.

Interactive Ported NetWare runs on any Intel Corp. 80386- and 80486-personal computer running Interactive Unix, the firm's implementation of Unix. Because it can run on a variety of hardware platforms, the product gives users more flexibility than hardware-specific implementations of Portable NetWare offered by firms such as NCR Corp., Data

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Briefs

Outsourcing fever continues. First Fidelity Bancorp, Inc. last week signed a 10-year, $450 million outsourcing contract with Electronic Data Systems Corp. (EDS). Under terms of the contract, EDS will manage the holding company's data center and network operations, and standardize on applications that support multiple product lines among First Fidelity's banking units.

As part of the deal, more than 300 First Fidelity systems and network employees are being transferred to EDS.

EDS will consolidate First Fidelity's data processing and network operations into one of the bank's two existing data centers, which are located in North Brunswick, N.J., and Philadelphia.

Calling volume taxes airlines. Many airlines last week experienced record calling volumes as travelers raced at the last minute to beat a Wednesday night deadline for cheap autumn fares.

Airlines said heavy calling volumes jammed phone lines and slowed computer reservation systems, making it difficult, if not impossible, for many travelers to book flights at the discounted rates.

American Airlines, Inc. reported that its SABRE computer reservation system handled more than 100 million messages on Wednesday, a record high. SABRE typically handles about 75 million messages daily.

US Sprint delivers the news on Iraq. US Sprint Communications Co. last week began distributing free hourly news briefs on the Iraqi crisis by facsimile. Users can receive the briefs, which are compiled from national news services, by dialing 1-800-676-2255 and entering their fax number. A spokesman said the carrier is distributing the briefs to publicize its new SprintFAX fax service.

Load up the DBMSs. Novell, Inc. last week said several data base management system vendors will be demonstrating versions of their DBMSs running on a NetWare 386 server in Novell's booth at NetWorld '90 in Dallas next week. Novell said Oracle Corp. and XDB Systems, Inc. will demonstrate NetWare Loadable Module (NLM) versions of their DBMSs. Informix Software, Inc. also said it would announce and demonstrate an NLM version of its On-Line DBMS at NetWorld.

Novell said it has been working with all three vendors under a program designed to port third-party DBMSs to NetWare 386. The company said it will continue to support its own NetWare SQL and Btrieve DBMSs, which also run under NetWare 386 and will be demonstrated at the show. The program was started to expand the number of NetWare 386 DBMS options available to users.

Laptop to support cordless net link. The *Washington Post* and *The Wall Street Journal* last week reported that AT&T plans to develop a laptop computer that can communicate using non-wireline network technology. The computer is expected to be jointly manufactured with Marubeni Corp., a Japanese firm, and will use components from Matsushita Electric Industrial Co. AT&T officials declined to confirm the reports but did acknowledge that AT&T and Marubeni have formed a research and development partnership.

3Com stock tumbles. 3Com Corp.'s stock lost one-third of its value last week after officials of the Santa Clara, Calif., local-area network vendor told analysts the declining U.S. economy is pressuring the company's near-term outlook. More than 4.8 million shares changed hands Wednesday, and the company's stock plunged 3⅞ to close at 8¾. The stock closed at 8¾ again on Thursday.

The stock fell after Christopher Paisley, 3Com's chief financial officer, told the Dow Jones Professional Investor Report that the company is cautious and is lowering short-term expectations. Paisley labeled the sell-off an overreaction to the firm's comments. However, he said the company's board will consider a share buy-back program at a Sept. 20 meeting in addition to an existing one million-share repurchase program.

Michel Guite, vice-president at Salomon Brothers, Inc. in New York, said he does not expect more bad news from 3Com. But he added that Microsoft Corp.'s decision to sell the LAN Manager operating system directly rather than strictly through OEMs "takes away one of the engines that would potentially be a driver of 3Com's recovery." 3Com helped develop LAN Manager and sells an OEM version of the product. 3Com's statement indicated that sales of its product had been hurt by confusion about Microsoft's products.

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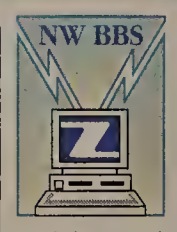

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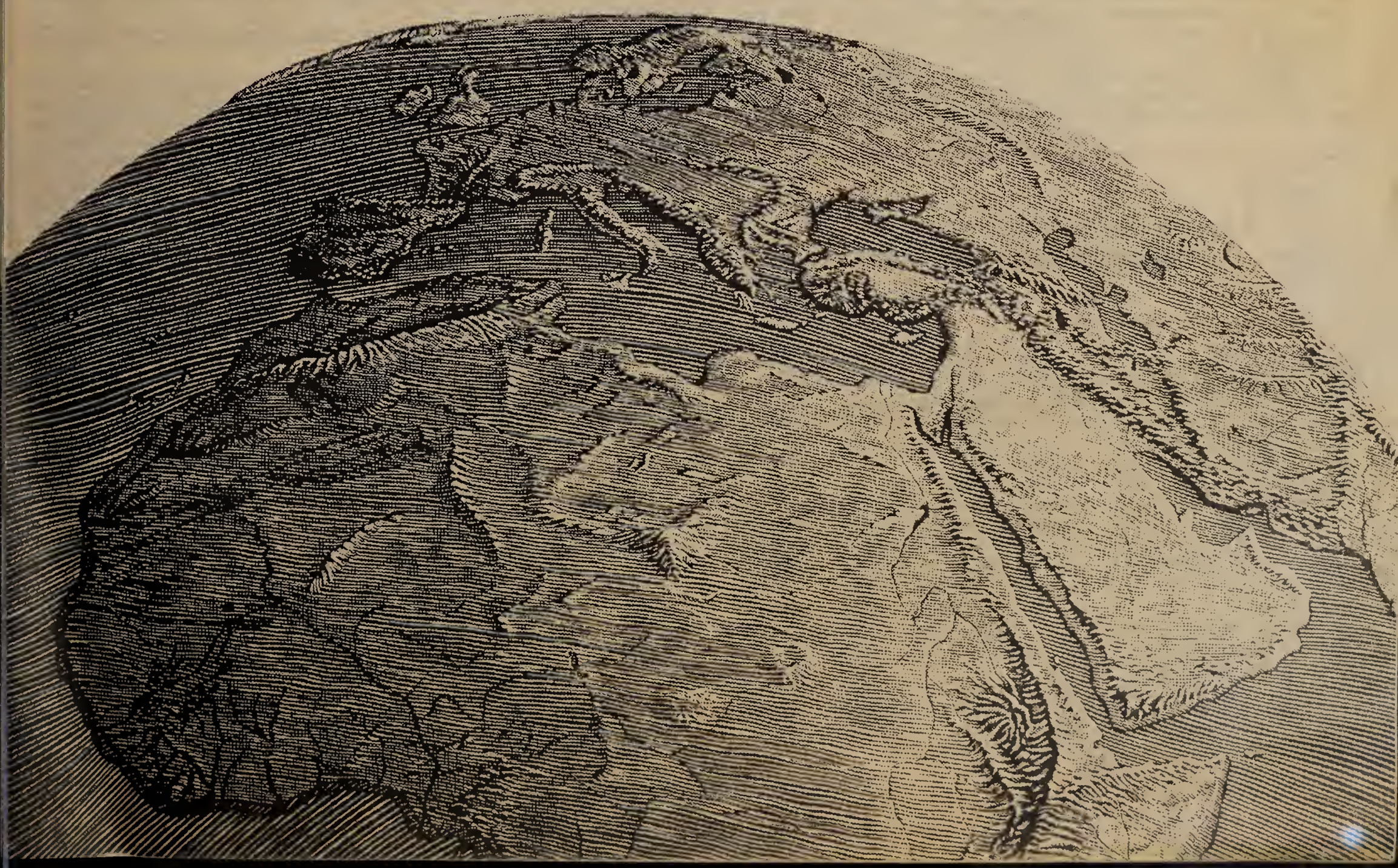

Users demand better ISDN net management products

Vendors work on remote mgmt., integration plans.

By Tom Smith
New Products Editor

ISDN customer premises equipment vendors are taking strides to satisfy users' network management needs, but users and analysts say there is still significant progress to be made.

Key targets for vendors are the ability to support remote management capabilities and the merger of Integrated Services Digital Network net management systems with enterprise management systems such as IBM's NetView.

A long-term goal is to provide management functions that comply with evolving international standards, such as those being developed in the Open Systems Interconnection/Network Management (OSI/NM) Forum.

ISDN net management capabilities have, however, increased significantly in the last couple of years, according to Patrick Krause, director of telecommunications in the facilities and systems department at McDonald's Corp. of Oak Brook, Ill., one of the earliest ISDN users.

McDonald's Basic Rate Interface (BRI) terminal adapters, for example, enable net administrators to set and change parameters such as packet size and whether traffic is circuit- or packet-switched, but they do not provide for general management of the network. McDonald's uses ISDN customer premises equipment from AT&T, Fujitsu Network Switching's ISDN Systems Group and Telrad Telecommunications, Inc.

The functions supported on this equipment are a significant improvement over McDonald's early ISDN experiences.

"There's been a tremendous amount of progress in the last three years on all fronts," Krause said.

But more is needed. "These capabilities are adequate for now, but I would like to see [vendors] develop a centralized network management capability to allow me, from a central device, to look out through the network at the CPE remotely."

Remote management

Although McDonald's has not benefited from remote management yet, at least one vendor, IBM, enables users to manage their ISDN station equipment on a remote basis.

Jeffrey Fritz is a data communications analyst at West Virginia University (WVU) in Morgantown, another high-profile ISDN user. He said IBM's 7820 ISDN Terminal Adapter, a stand-alone BRI that supports V.35, X.21 or RS-232 interfaces, can be managed remotely. WVU uses terminal adapters from other vendors as well, but Fritz said IBM's is the only one he is aware of that has any management functionality.

Using a stand-alone version of IBM's NetView/PC product, any IBM ISDN Terminal Adapter at the university can be managed from a single personal computer.

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New T-3 framing format provides performance data

By Bob Wallace
Senior Editor

An emerging T-3 framing format that enables users to conduct in-service testing and performance monitoring of individual circuits on carrier-supported 45M bit/sec T-3 links has won widespread user backing.

Developed by AT&T Bell Laboratories, C-bit parity is a synchronous framing format capable of passing information, from carrier networks to user T-3 multiplexers, needed to test lines and monitor circuit performance.

The existing M13 asynchronous framing format widely used today requires multiplexers to insert control bits for synchronizing each set of four T-1 bit streams into a T-2. Bit stuffing is used again when an M13 multiplexer integrates seven T-2s to form a T-3.

But since the T-2s created from the T-1s are already synchronized, the second round of bit stuffing is unnecessary. With C-bit parity, the control bits are used instead to carry circuit performance data.

The 21 Cbits in each T-3 frame can carry line performance data such as the bit error rate, alarms that alert users to equipment and line failures, and control information used to activate and deactivate loop-back tests on any of the T-3's 28 T-1s.

A C-bit parity specification, which is backed by AT&T, has been presented to the ANSI membership and could be approved as a national standard by year end.

Users are clamoring for C-bit parity because it enables them to monitor end-to-end circuit performance, a key capability not supported by M13.

Everett Rigsbee, senior network services director for Boeing Computer Services Co.'s Network Services Division, said that from this time forward, his firm will only buy T-3 links with C-bit parity. "The only way we can find errors on a T-3 is to take the circuit out of service, attach a signal generator and use a test box to measure the bit error rate," Rigsbee said. "The in-service monitoring and testing supported by C-bit parity is the only way to go."

Boeing Computer Services began using T-3 three years ago and is now considering a plan to upgrade its first multiplexers, which do not offer performance monitoring or testing capabilities, to support C-bit parity, Rigsbee said.

Boeing Computer Services uses fiber-optic service to network 14 campuses in the Seattle area and connect these facilities to clusters of locations in Huntsville, Ala., Philadelphia, Spokane, Wash., Portland, Ore., Vienna, Va., and Wichita, Kan., Rigsbee said.

"We're very big supporters of T-3 performance monitoring," Rigsbee said. "We've found it difficult to effectively track our T-3s circuits without it."

C-bit parity is also a concern of prospective T-3 users.

Jim Le Mon, senior systems analyst for Sea-Land Services, Inc., a transportation firm in Elizabeth, N.J., said his company is considering using T-3 between two large sites to support host-to-host data transfer, computer-aided design and manufacturing and videoconferencing applications, and would like the link to support C-bit parity.

"We would definitely want the ability to monitor the entire T-3 link," Le Mon said. "We'd want to know about any errors on the [different] channels as early as possible."

The need for T-3 performance monitoring capabilities will increase as the T-3 market grows, analysts say. Dataquest, Inc., a research and consulting firm in San Jose, Calif., predicts that the number of T-3 circuits in use will increase from 2,500 this year to

(continued on page 63)

> "The in-service monitoring and testing supported by C-bit parity is the only way to go."
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Netwise unveils RPC tools for IBM mainframes, Macs

By Jim Brown
Senior Editor

BOULDER, Colo. — Netwise, Inc. last week extended its remote procedure call (RPC) technology to run on IBM mainframes and Apple Computer, Inc. Macintoshes.

The introduction of Netwise Mainframe RPC and Netwise RPC Tool for Macintosh will enable software developers to write distributed processing applications by using their native programming language.

Netwise Mainframe RPC enables developers familiar with the C programming language to write routines that enable microcomputer or workstation applications to kick off mainframe tasks, while mainframe programmers can write COBOL and CICS routines to initiate tasks on remote workstations or microcomputers.

Netwise Mainframe RPC runs on IBM hosts running MVS, CICS and VTAM. The software uses IBM's Advanced Program-to-Program Communications Application Program Interface and the LU 6.2 protocol to transmit RPC commands between LAN-based devices and the mainframe.

Applications written with Netwise Mainframe RPC can interact with applications that support the Netwise RPC Tool and run on Sun Microsystems, Inc. workstations, OS/2 Extended Edition-based microcomputers and Digital Equipment Corp. VAX minicomputers.

Netwise teamed up with Imperial Oil, Ltd. of Canada to build Netwise Mainframe RPC. The user was looking for a method to transparently link microcomputers on its local-area networks across Canada to an IBM host near Toronto in order to support a strategic distributed inventory control application.

A true peer

The software enables Imperial Oil's host to offer application, compute and data base services to remote microcomputers, said Norman Judah, project leader in the technology department. Additionally, Netwise Mainframe RPC lets the mainframe act as a client that requests data, application processing or computational services from devices on the LAN.

"What we were looking for from an architectural perspective was something to bring the mainframe on the LAN as a true peer node," Judah said.

Judah said Netwise Mainframe

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Network architecture helps utilities link different nets

Electric company group based blueprint on OSI.

By Ellen Messmer
Washington Correspondent

PALO ALTO, Calif. — The Electric Power Research Institute (EPRI), a consortium of leading electric companies, last week unveiled a network architecture that enables utilities to link disparate networks companywide.

The organization's Utility Communications Architecture (UCA), which is based largely on Open Systems Interconnection protocols, is a blueprint that will enable power companies to link multiple isolated networks into a single network.

Ultimately, UCA would enable net managers to create a shared data base of information that could be accessed by users in any part of the company.

By implementing UCA, power companies will force vendors to roll out standards-based offerings that conform to the specification in much the same way the nation's top manufacturers' leveraged the Manufacturing Automation Protocol to dictate product needs to vendors.

"Vendors should get the message we're interested in moving to a standards environment," said Augie Nevolo, director of the utility communications program at Pacific Gas and Electric Power Co. (PG&E) in San Francisco.

Wade Malcolm, EPRI's project manager for UCA, said some vendors have already responded enthusiastically, among them cisco Systems, Inc., Honeywell, Inc., Hewlett-Packard Co., Retix, The Wollongong Group, Inc. and Unisys Corp.

Michael Shea, supervising engineer in telecommunications at Houston Power and Lighting Co., said UCA was created to connect islands of automation common in power plant operations today ("Utility group crafts OSI net strategy, *NW*, July 1988).

For instance, electric companies maintain separate — often proprietary — networks to support power generation and distribution, energy management, customer service and corporate tasks, such as billing and accounting.

But an open systems structure will enable users to collect information from these islands and store it on a corporate data base, where company personnel will be

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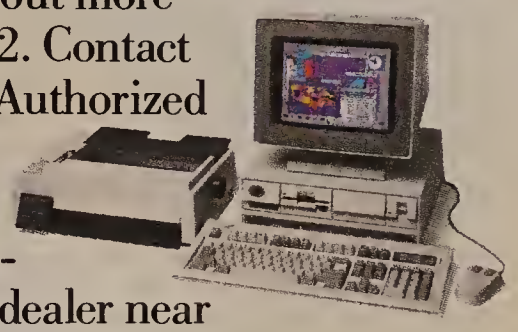

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AT&T signs on four more customers for Tariff 12

Carrier announces latest custom net deals with Avis Rent A Car, ITT, Textron, Adolph Coors.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — AT&T announced last week the signing of four new Tariff 12 deals, one of which is the smallest deal it has offered to date.

Custom network deals were signed with Avis Rent A Car System, ITT Corp., Textron, Inc. and Adolph Coors Co. AT&T also acknowledged that Caterpillar, Inc. had entered into a Tariff 12 arrangement in a contract filed last April.

The five-year Avis contract is worth $35 million and the Caterpillar deal, also a five-year pact, is worth $22.5 million. The ITT contract is worth $37.7 million over three years. Terms of the Textron deal were not released.

The Adolph Coors deal, the smallest ever Tariff 12 deal, is worth just over $1 million per year for three years, according to a source who requested anonymity. That contract, which covers voice, 800 and data services, is worth half as much as AT&T's next smallest Tariff 12 plan.

AT&T has now filed more than 60 custom network plans under Tariff 12, which gives users a customized network that can include voice, data, 800, 900, calling card and international services. Some customers have also received specialized billing or network management services as part of their Tariff 12 arrangements.

For its part, Avis, which has done business with all of the major carriers, is handing over virtually all of its domestic voice and data traffic to AT&T. The Tariff 12 arrangement will include 800, Software-Defined Network (SDN) and leased-line data services, including 280 9.6K bit/sec lines, two 56K bit/sec lines and one 64K bit/sec line.

Peter Tittler, vice-president of networks and technology at Avis, said that by consolidating the bulk of its traffic with AT&T, the company will be able to save money and upgrade its services. Currently, most of the firm's 1,000 car reservation sites are tied to a centralized reservation center in Tulsa, Okla., via 4.8K bit/sec lines. With Tariff 12, the company will upgrade all lines to either 9.6K, 14.4K or 56K bit/sec lines.

At rental locations, the new network will mean faster response time and enhanced communications with the reservation center and headquarters location in Garden City, N.Y., Tittler said. "There were certain things that we were afraid to [transmit] to the rental locations because they required too much bandwidth and would slow down the response time of the bread-and-butter rental transactions," he said.

The major voice application the network supports is 800 traffic into the reservation center from 1,300 rental locations, travel agents and the public. The 800 service played a key role in Avis' choice of AT&T as its vendor, since the firm already used AT&T's 800 service and would have had to change numbers if it awarded the contract to another vendor.

"We associated a cost with changing that [800] number. If we used a competitor's 800 service, they had to be less [expensive] than AT&T in addition to offsetting the cost of changing our 800 number," Tittler said.

AT&T's Tariff 12 contract with ITT covers 800, voice and calling card services for ITT's major business units, including ITT Hartford Fire Insurance Co. and ITT Sheraton Corp.

ITT also signed contracts last week with MCI Communications Corp. and US Sprint Communications Co. MCI will provide Vnet and 800 services for ITT Hartford and Vnet, Prism and operator services for ITT Sheraton. MCI will also supply T-1 and digital data services to several of ITT's subsidiaries. The MCI contract is worth $18 million over three years. The US Sprint deal with ITT is worth up to $10.8 million over three years and is for domestic voice services.

ITT's strategy is to use multiple vendors for all of its business operations, said Sherman Murphy, head of ITT's Corporate Communications Council, which makes telecommunications purchasing decisions. ITT already used all three vendors, and the percentage of traffic each handles will remain fairly constant, Murphy said.

Some of the major objectives ITT had in renegotiating its carrier contracts were reducing rates, stabilizing rates through long-term contracts, ensuring network reliability and better monitoring of carrier billing, Murphy said.

IBM offers OS/2 graphical user interface for NetView

By Paul Desmond
Senior Editor

POUGHKEEPSIE, N.Y. — IBM will announce its own OS/2-based NetView graphical interface here next week, but sources said the company will package the offering with its existing NetCenter interface because the new product lacks some key features.

Sources said IBM will also announce a new pricing structure that effectively unbundles NetView software components so users with multihost networks will not have to buy a full version of NetView for each mainframe.

In addition, IBM is expected to announce SystemView, a Systems Application Architecture (SAA)-compliant blueprint designed to aid users and software developers in building cohesive network and systems management applications. SystemView will provide a standard method for defining data, a standard user interface to all management applications and a common set of tools for developing management applications, sources said.

"It's a grand plan for building applications for the business of running the data center and the network," said one source familiar with the announcement who requested anonymity. "SystemView is to management what SAA is to applications."

IBM will finally announce its own graphical interface to NetView next week. But according to an early user of the product, dubbed NetView Graphical Monitor Feature (GMF), the vendor has acknowledged some shortcomings with the product.

NetCenter addresses some of those shortcomings, and IBM intends to add NetCenter features to GMF over time, said the user, who asked not to be named.

In the interim, IBM decided to bundle NetCenter with GMF to give users access to those features immediately.

The user said GMF offers limited flexibility in its color-coding scheme. In addition, analysts said GMF supports only a view of the network status and does not allow control over NetView from the graphical interface. Instead, users must open a window into a 3270 session and access NetView text commands as they always have.

Also, GMF does not offer support for non-Systems Network Architecture devices, a feature that is supported by NetCenter.

GMF's graphics presentation is said to be better than NetCenter's, and the product can draw network maps automatically from data stored in users' network configuration tables. Also, because it is OS/2-based, GMF allows users to zero in on the exact level of detail they want by opening multiple windows. NetCenter forces users to scroll through multiple levels of detail to get to the level they need.

GMF is expected to be available Dec. 31 for MVS systems, but not until March 1992 for VM systems. Its price is rumored to be in the $5,000-to-$8,000 range per workstation.

IBM declined to comment on

(continued on page 62)

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NCR set to demo wireless local network at NetWorld

WaveLAN would eliminate LAN cabling costs.

By Jim Brown
Senior Editor

DAYTON, Ohio — NCR Corp. last week said it will introduce and demonstrate a wireless local-area network at NetWorld '90 next week in Dallas.

NCR's WaveLAN will enable microcomputers and other devices to communicate at speeds up to 2M bit/sec using spread-spectrum radio technology. NCR said the product is targeted at customers that frequently change LAN configurations and those with offices where it is difficult to run cables between workstations.

For example, retailers can use WaveLAN to link electronic cash registers throughout a store without having to run cable. A retailer could place registers in unusual locations to support a special sale or extend register lanes to handle busy buying periods such as the Christmas shopping season.

NCR said banks could use WaveLAN to link microcomputers on the desks of customer service representatives in large open lobbies.

"It's really tough to run network cable under marble floors or up above if marble columns in the lobby are high," said Scott Schafer, director of marketing for NCR's workstation products.

Cabling is one of the greatest hidden costs in installing LANs, according to several recent reports. NCR said a study it conducted shows labor and material costs for LAN cabling averages about $750 per node.

WaveLAN will compete against a handful of other wireless LAN technologies on the market today, including infrared LANs and other lightwave systems, which require line-of-sight communications between LAN nodes.

NCR, which has filed for eight different patents on its wireless technology, said it is considering submitting the technology for adoption as an Institute of Electrical and Electronics Engineers, Inc. standard. IEEE last month formed the P802.11 committee to study wireless communications and named Vic Hayes, an NCR systems engineer in the Netherlands, as acting chairman.

Developed over the last three years, WaveLAN consists of a personal computer board, an antenna and a software driver that enables the board to support Novell, Inc.'s NetWare client software. The 16-bit board resides in microcomputers with an AT bus. The antenna includes a short coaxial cable that is linked to a BNC connector on the board.

The board also includes a 1W radio transmitter and receiver that broadcasts data across a band ranging from 902 MHz to

(continued on page 61)

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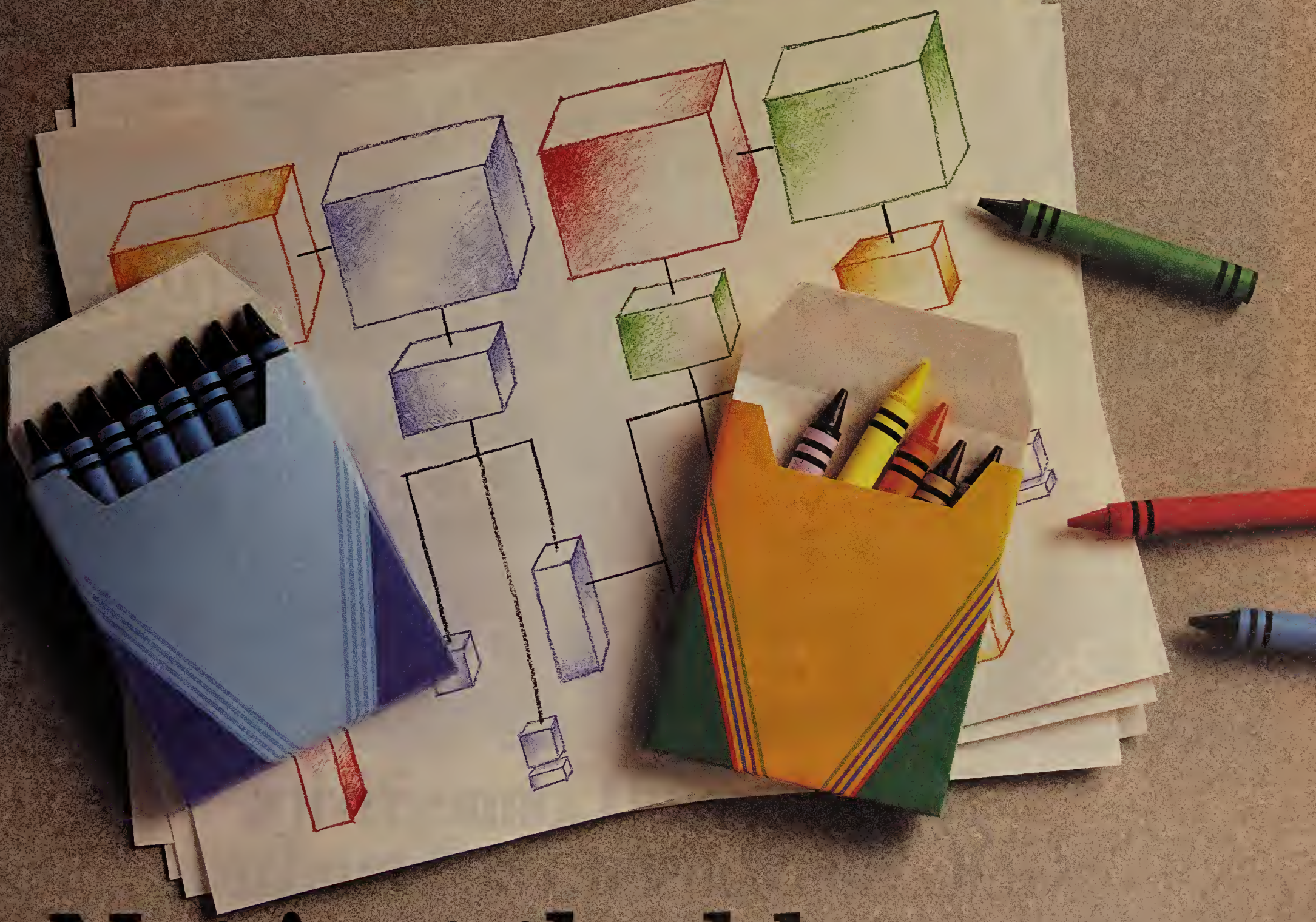

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See The FAXNeT Form on Page 33

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

IBM's marketing of Token-Ring as a network for 3270 terminals is off to a slow start. Yet shipments of Token-Ring-attached 3174s will increase 44.8%, from 8,000 units in 1989 to 51,000 by 1994, according to International Data Corp., a Framingham, Mass., market research firm.

People & Positions

Infotron Systems Corp. last week announced that it has appointed **Ken Weber** to the post of vice-president of U.S. sales. Weber will be responsible for overseeing corporate accounts and generating new business.

Weber will report to **Jerry Engel,** senior vice-president of marketing, U.S. sales and service. Engel previously handled U.S. sales.

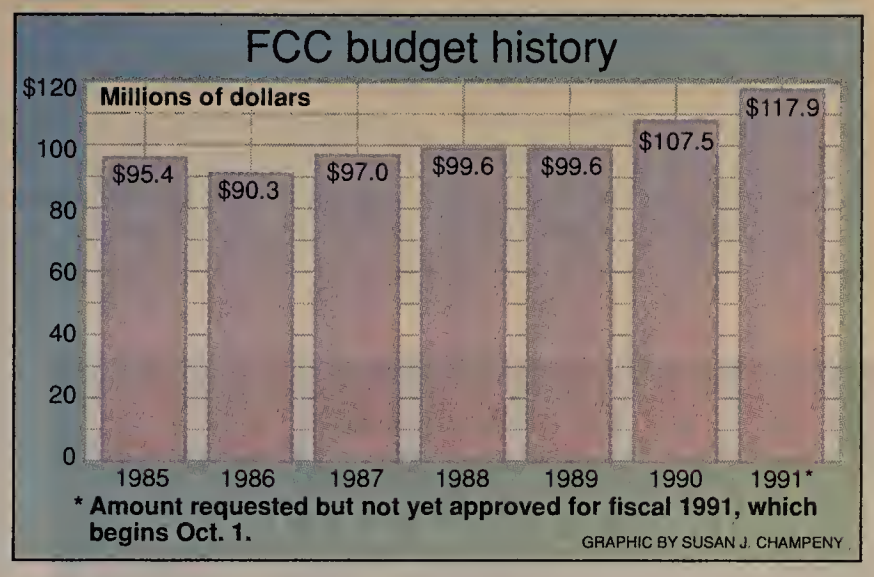
Most recently, Weber worked as vice-president of sales at **Commodore Business Machines, Inc.**

Robert Kavner, AT&T's group executive for data systems and federal systems, has resigned from the board of directors at **Sun Microsystems, Inc.**

Kavner was appointed to Sun's board in June 1988, following AT&T's purchase of a major portion of Sun stock.

AT&T last week indicated it does not intend to designate a replacement for Kavner, who said he resigned because he fulfilled AT&T's intentions to assure that the two companies worked smoothly to develop the Unix System V Release 4 operating system.

David Systems, Inc. last week said it named **David Froke** director of hardware engineering. Most recently, Froke served as senior general manager and director of engineering at **Samsung Information Systems, Inc.**



FCC to face massive budget, worker cuts

If Congress, president can't reach compromise by Oct. 1, FCC may be forced to slash 30%.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The Federal Communications Commission may face budget cuts of more than 30% for fiscal 1991 and last week notified employees that they may be furloughed for as many as 22 days to cut costs.

If Congress and the president fail to reach a budget compromise by the fiscal year beginning Oct. 1, the FCC will have to trim $34.3 million, or about 32%, from its spending, according to estimates from the U.S. Office of Management and Budget.

If a federal budget deal is not hammered out, automatic cuts, known as sequestration, will be mandated by the Gramm-Rudman-Hollings Act.

Such drastic cuts in the FCC's budget could seriously hamper the agency's ability to oversee important areas such as tariff filings, complaints, enforcement and audit operations, according to FCC officials.

The FCC has been threatened with the possibility of budget cuts and furloughs before, but lawmakers have been able to reach some resolution on spending that spares the agency drastic cuts.

According to an FCC spokesman, this would be the first time employees have been furloughed. On one other occasion, FCC employees were sent home for a few hours because Congress failed to meet a budget deadline but employees were later compensated for the time.

Reductions of this magnitude "will do serious damage to the accomplishment of the commission's important mission and adversely impact all employees who work here," stated Michelle Oppenheimer, associate managing director for human resources management at the FCC, in a memo to employees.

Richard Firestone, chief of the FCC's Common Carrier Bureau, which handles all tariff matters and telephone company audits, said that such deep budget cuts and employee furloughs would have a severe impact on the ability of the agency to do its job.

He said no definitive decisions have been made about what operations might be curtailed or shut down if the budget is cut, but added that furloughs are expected to be across the board.

> Such drastic cuts in the budget could hamper the FCC's ability to oversee important areas.
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"If there's pain involved, it will be shared by all," he said.

Firestone said a number of options are being considered for the furloughs, including a "rolling" system that would have a skeleton crew there every day rather than having the agency closed entirely for a day.

Details about how the agency will handle tariff filings during furlough periods have yet to be worked out.

Another source confirmed that the FCC is considering alternating furloughed employees to keep the agency open. That source said if furloughs become necessary, three of the furlough days are being planned for October.

FCC Chairman Alfred Sikes was on vacation last week and un-

(continued on page 10)

ISDN adapter makers race to support NTI's DMS-100

Firms offer dual support for AT&T, NTI switches.

By Ellen Messmer
Washington Correspondent

An increasing number of customer premises equipment makers are building support for Northern Telecom, Inc. central office switches into their ISDN terminal adapters.

Equipment makers who add support for the switch are hoping to get a marketing edge over suppliers that only support AT&T's central office switches. These vendors claim they can protect user purchases by making them flexible enough to support either brand of switch.

Some firms, such as Newbridge Networks, Inc. and Universal Data Systems, Inc. (UDS), support both the AT&T 5ESS and the Northern Telecom DMS-100, while others are working toward that goal.

Just last month, Fujitsu Network Switching of America, Inc. announced support for the DMS-100 on its SRS-400 and SRS-410 Integrated Services Digital Network terminal adapter.

Dean Wolf, marketing manager of the ISDN Systems Division, said Fujitsu originally supported only the 5ESS because there were more ISDN Basic Rate Interface (BRI) lines deployed that supported it.

"Northern Telecom is starting to make a lot of inroads," Wolf said. This is forcing customer premises equipment makers to build support for both switches into their products, he added.

A spokeswoman for Indiana Bell Telephone Co., where Fujitsu's terminal adapter upgrades are being beta-tested, noted that the DMS-100 now supports 37% of the digital nodes in its network, as opposed to the 5ESS, which supports 27%. The remaining 36% are analog.

Wolf said technical differences between the two switches are narrowing, making it less expensive to support both.

But analysts and industry observers say they think that switch compatibility is at least two years away.

Until then, users will buy stand-alone ISDN terminal adapters that are compatible with the regional Bell holding company central office switch to which they are connected. Terminal adapters let users' existing communications terminals and systems communicate via ISDN.

(continued on page 10)

INDUSTRY BRIEFS

Novell, Inc. last week reported net income of $26.1 million for its fiscal third quarter ended July 28, up 122% over the comparable period in 1989. The company also posted a 29% revenue gain for the quarter, up to $131.1 million vs. $101.8 million for the comparable period a year ago.

Raymond Noorda, Novell's chairman, president and chief executive officer, said the company's extraordinary earnings increase is largely attributed to the company's shift from being a supplier of LAN hardware products to becoming a network software specialist. Software revenue for the third quarter rose sharply, reaching 80% of total revenue vs. 50% this time last year. This continuing shift in Novell's revenue mix was the principal factor in increasing Novell's third-quarter gross margins to 75% of net revenue, the company said. By contrast, in last year's third quarter, Novell reported gross margins of 56%. For the first nine months of fiscal 1990, Novell posted revenue of $357 million, up 15% from $310.8 million last year. Net income jumped 80%, to $61.7 million from $34.3 million.

US Sprint Communications Co. last week said it signed two agreements with resellers that plan to market the carrier's long-distance services.

US Sprint signed **USTeleCenters,** a Boston telecommunications equipment and service provider, to sell its Dial One, Sprint Plus, Dial One WATS and Ultra WATS services to business and residential users. US Sprint also announced that it signed a similar agreement with **Premier Telecom Products, Inc.,** a United Telecommunications, Inc. company. Premier Telecom Products, an equipment and installation services supplier, will now market US Sprint's long-distance services nationwide.

ISDN adapter makers race

continued from page 9

Vendors that support both switches point out that their equipment represents a protected investment because it would provide support on a different switch in the event a company moves.

But for vendors, support for both the 5ESS and DMS-100 signifies the ability to compete more effectively by being able to serve a wider audience.

Since 1988, UDS, a subsidiary of Motorola, Inc., has offered the UDS TA100, a 64K bit/sec asynchronous/synchronous terminal adapter. By pressing a button on the interface, users can switch between support for the 5ESS or the DMS-100, said Cindi Branham, UDS product marketing manager.

Likewise, Newbridge Networks has three ISDN stand-alone terminal adapters — the 1601 (19.2K bit/sec asynchronous and synchronous RS-232), the 1602 (64K bit/sec synchronous RS-449) and the 1603 (64K bit/sec synchronous V.35) — which enable a user to support both central office switches.

Fujitsu recently unveiled a removable cartidge for its SRS-400 (19.2K bit/sec synchronous/asynchronous) and SRS-410 (64K bit/sec synchronous) adapters. Users simply insert a cartridge to support either switch.

Gandalf Data, Inc., a subsidiary of Gandalf Technologies, Inc., plans to make available DMS-100 support for its TA-1 in November, said Hank Morgan, the firm's business manager.

The Dracon Division of Harris Corp. manufactures five different ISDN stand-alone terminal adapters, three of which support both the AT&T and Northern Telecom switches, said Steve Coffelt, Dracon Division ISDN product manager. But Coffelt emphasized that Dracon's long-term goal is to work toward full automation of the terminal adapter so that the unit senses the required switch and adjusts itself.

One vendor that does not plan to support the DMS-100 is AT&T.

Jack McDonough, product manager for ISDN terminals at AT&T's Network Systems Division, said AT&T will only support its 5ESS switch.

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FCC to face budget cuts

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available for comment. However, at a press briefing in July, Sikes said the idea of a then-estimated 25% cut in the FCC's budget scared him.

"That would be a deep enough cut, and every department of the commission would have to absorb some of the cuts," Sikes said. At the time, Sikes did not mention the possibility of furloughs but said he feared layoffs would be necessary.

Sikes added that FCC obligations already exceed resources. "We face a real resource problem, and it frequently impinges on our ability to do a good job," he said.

As required by the Office of Management and Budget, the FCC submitted a plan specifying the cuts it intends to make to meet a 32% reduction in funding. Details of that plan were not made public.

In the memo notifying employees of the possible furloughs, Oppenheimer indicated that they would affect all employees equally. The only exceptions might be employees on special assignments not costing the FCC any money or those covered by other federal rules requiring continued pay.

It is also possible that some positions might be deemed to be so crucial to the FCC's functioning that they could not be curtailed, Oppenheimer said.

However, she stated in the memo, "We do not anticipate exempting employees under this category except in the event of a national emergency or similar exigency."

Oppenheimer characterized the budget situation as "extremely uncertain" and said furloughs of more than 22 days might be necessary. Employees were assured that they would not be furloughed for more than four days during any one pay period. The memo said furloughs could begin in late September, 30 days from the date of notification. If additional furloughs are needed, a second notice will be sent out.

Worth Noting

AT&T last week won back the New York Metropolitan Transit Authority's (MTA) public pay phone business from US Sprint Communications Co. AT&T signed a three-year, $25.2 million contract with the MTA to provide long-distance service for public pay phones at all MTA facilities.

Carrier Watch

US Sprint Communications Co. last week announced that USTeleCenters, a telecommunications equipment vendor in Boston, will sell US Sprint calling services to midsize businesses in the Northeast and mid-Atlantic states.

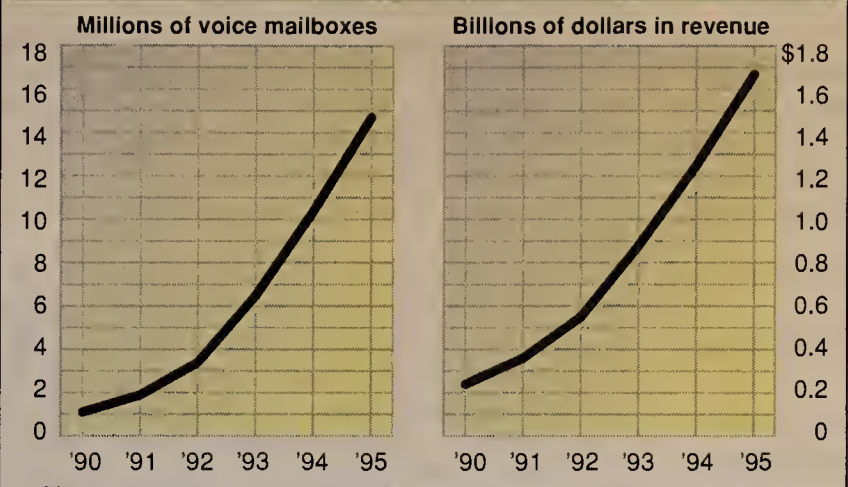
As an authorized US Sprint sales agent, USTeleCenters will sell US Sprint's Dial 1 WATS to businesses with as many as 550 hours of monthly outbound calling and will offer FONline 800 for users that receive a maximum of 500 hours of calls per month.

USTeleCenters will also sell US Sprint's Ultra WATS service to customers that make more than 550 hours of monthly outbound calls and Ultra 800 service to users that receive more than 500 hours of calls per month.

MCI Communications Corp. last week added two large users, Petrie Stores Corp. and Metpath, Inc., to its stable of Vnet virtual network customers.

Petrie contracted for a Vnet linking its Seacaucus, N.J., headquarters to its 1,600 specialty stores in the U.S., Puerto Rico and the U.S. Virgin Islands. U.J. Gallo, Petrie's chief information officer, projected that Vnet will enable his firm to cut communications costs by 25% annually.

Voice mail service usage skyrockets



Figures include services provided by local and long-distance carriers as well as voice mail service bureaus.

SOURCE: MARKET INTELLIGENCE RESEARCH CORP., MOUNTAIN VIEW, CALIF.
GRAPHIC BY SUSAN J. CHAMPENY

AT&T files 11th Tariff 15, a deal for Rohm and Haas

Plan would give firm 90% discount on SDN calls.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — In its 11th customer-specific discount plan under Tariff 15, AT&T recently filed for a $2.2 million deal for Rohm and Haas Co., a specialty chemical company based in Philadelphia.

The deal gives the company an 90% reduction on the fee for calls placed using a remote access code to a Software-Defined Network (SDN).

The remote access surcharge is usually 30 cents per call, but Rohm and Haas will pay only 3 cents per call if the discount plan is approved. Calls must be terminated at switched access locations, and the company must sign up for SDN for three years.

Not giving up

Despite questions about the legality of Tariff 15 custom deals and regulatory delays that have held up implementation of customer networks for up to eight months, AT&T is continuing to press forward with its Tariff 15 offers ("AT&T plods on with troubled Tariff 15," *NW*, Aug. 7).

Tariff 15 gives AT&T the ability to respond to off-tariff offers from rival vendors. Competitors protest the AT&T deals, saying that single-customer discounts violate prohibitions against discrimination in the Communications Act of 1934.

In its filing, AT&T said Rohm and Haas was being courted by US Sprint Communications Co. with a deal that would lower its VPN FON Calling Card surcharge from 25 cents to 3 cents.

AT&T claims that its remote access feature of SDN provides comparable functionality to the VPN FON Card.

US Sprint also proposed 800 and international services to Rohm and Haas, but AT&T said those offers are based on tariffed rates and conditions.

Putting on the pressure

AT&T told the Federal Communications Commission that Rohm and Haas had informed the carrier it would switch its business to US Sprint unless AT&T made a comparable offer.

AT&T said Rohm and Haas was being courted by US Sprint with a deal that would lower its VPN FON Card surcharge from 25 to 3 cents.

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Rohm and Haas currently splits its traffic among AT&T, US Sprint and MCI Communications Corp.

AT&T now carries about 1.4 million minutes of traffic for Rohm and Haas each year, while US Sprint and MCI carry two million minutes and 3.4 million minutes, respectively.

If AT&T gets FCC approval to proceed with the Tariff 15 deal, the carrier anticipates that it would win all of Rohm and Haas' traffic, which is roughly 6.8 million minutes annually.

AT&T told the FCC its revenue from the deal over the three years would be $2.24 million. AT&T estimates a profit of $481,900 for those three years.

The procedure that saved Mass. millions

Telecom director Len Evenchik talks about how his department caught N.E. Tel's $6m mistake.

The $6 million Centrex billing error found by the telecommunications director for the Commonwealth of Massachusetts in the state's New England Telephone and Telegraph Co. bills won't rescue the state from its fiscal woes, but it certainly won't add to them.

The director, Len Evenchik, discovered in March that the carrier had been charging the commonwealth twice for each message unit call during the last five years. He helped New England Telephone track the problem to billing software running on an adjunct processor in the carrier's Bowdoin Street central office in Boston. Five weeks later, the problem was corrected, and the state received a $6 million credit. Evenchik last week discussed the process he followed to uncover the billing blunder in an interview with *Network World* Senior Editor Bob Wallace.

How did you uncover the problem?

We were in the process of reviewing bills for intra- and interstate services, which together total about $10 million a year. The review grew out of a reorganization that had brought telecommunications under MIS.

We started by understanding that the network is made up of pieces [and] you study each individual piece.

We started with Centrex message units, which represented a $250,000 [portion of the bill per] month because we noted that the number of message units seemed high.

We took the number of message units we were charged and divided that by the number of end users to come up with an average.

Then we went to users in downtown Boston with comparable networks and local calling patterns and matched our average against theirs.

Our average was 50% to 100% higher than theirs, which indicat-

(continued on page 12)

WASHINGTON UPDATE

BY ANITA TAFF

RBHCs charged with misleading FCC. A coalition of user groups, consumer groups and a long-distance carrier protested to the Federal Communications Commission last week that the regional Bell holding companies are presenting misleading information to the commission about price cap regulation.

The Ad Hoc Telecommunications Users Committee, Consumer Federation of America, International Communications Association (ICA), MCI Communications Corp. and the National Association of State Utility Consumer Advocates stated in a letter to FCC Chairman Alfred Sikes that the RBHCs are presenting highly speculative arguments to back their claims that the productivity demands built into price cap regulation should be lowered.

The coalition blasted suggestions from the RBHCs that the FCC lower the productivity demands of price cap regulation because they believe the U.S. is about to go into a recession. "On its face, the [RBHCs'] position is suspect because it would require the commission to discount the solid empirical record regarding [the RBHCs'] recent rate history by a speculative — and unquantifiable — 'recession' factor," the coalition wrote.

The RBHCs have long argued that the productivity factor in the price cap formula should be lowered.

The coalition also presented evidence that during a recession, telephone company productivity has remained higher than the economy as a whole. Therefore, if the U.S. is going into a recession as the RBHCs claim, the productivity factor should actually be raised rather than lowered.

The price cap formula contains a productivity factor, which

(continued on page 12)

PacBell users employ ISDN BRI to access switched 56K services

New capability enables customers to bridge ISDN islands.

By Barton Crockett
Senior Editor

SAN FRANCISCO — Pacific Bell has announced that three customers of its Integrated Services Digital Network Basic Rate Interface (BRI) service will use a new capability that makes it possible to utilize the service for accessing long-haul switched 56K bit/sec services.

While Centrex IS has been available from Pacific Bell since last year, up until July, customers could only use the service for local ISDN traffic, according to a Pacific Bell spokesman. The ability to use Centrex IS to access switched 56K bit/sec interexchange services will help customers bridge ISDN islands.

The first customers to use this new capability are Compression Labs, Inc., a vendor of videoconferencing equipment in San Jose, Calif.; Ricoh, Ltd., an electronics firm in Tokyo; and Tekelec, Ltd., a maker of ISDN testing equipment in Calabasas, Calif.

Ricoh recently used the service to access AT&T's Accunet Switched 56 service to conduct videoconferences with a company office in Chicago and, separately, to send Group IV facsimiles to and from the Chicago office at 56K bit/sec.

The local link in Chicago was supported by a BRI link from Illinois Bell Telephone Co., according to Peter Cybuck, a manager of product planning at Ricoh, which makes Group IV fax machines. Ricoh also markets videoconferencing systems from PictureTel Corp. in Japan.

Cybuck said this was the first time, to his knowledge, that ISDN services from different local exchange carriers in the U.S. had been bridged in a commercial setting using a switched digital service from an interexchange carrier. "Illinois Bell's done this in Japan before, but I don't think anyone had done it in the U.S.," Cybuck said.

> All three of the users said they plan to use Centrex IS to communicate with offices in Japan.
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All of the users said they plan to use Centrex IS to communicate with offices in Japan. Each will use AT&T's switched 56K bit/sec service to connect with switched 56K bit/sec service from Kokusai Denshin Denwa, Ltd., Japan's dominant international carrier, which in turn will hand off switched 56K bit/sec traffic to Japan's dominant domestic carrier, Nippon Telegraph and Telephone Corp. (NTT).

Users in Japan will receive these transmissions via NTT's INS-Net BRI ISDN service. The links will be used by the companies to support videoconferencing at 112K bit/sec, Group IV fax and computer file transfers.

Compression Labs also plans to use Centrex IS to access switched 56K bit/sec services from US Sprint Communications Co., according to Tom Marsh, a marketing manager with the videoconferencing firm.

According to Marsh, monthly charges for Centrex IS are about a tenth of what it costs to access switched 56K bit/sec interexchange services using Pacific Bell's switched 56K bit/sec service, Public Switched Digital Service.

He said Compression Labs had to pay about $800 in monthly access fees for two switched 56K bit/sec lines from Pacific Bell, while the firm pays less than $60 per month to subscribe to two Centrex IS lines.

Pacific Bell said Centrex IS will be available at 35 central office locations in major metropolitan areas throughout California by the end of the year. The company requires that users buy a minimum of two Centrex IS lines. The full 2B+D service costs $29 per month for each line.

Washington Update

continued from page 11

mandates that the RBHCs keep future price increases to a specified level below inflation. Currently, that productivity factor is set at 3%. Therefore, if inflation for a given year is 4%, the RBHCs would be allowed to raise prices 1%.

The productivity factor is based on studies of the historical productivity of telephone companies. But many critics of price cap regulation, including most of the groups that signed the letter last week, claim that historical figures for the decades preceding divestiture are misleading. If the FCC looked at productivity of the telephone companies only during the years after divestiture, the productivity factor would need to be raised, they say. Every percentage point included in the factor could be worth hundreds of millions of dollars to consumers.

The coalition also complained that the RBHCs are presenting through the back door "large new areas of substantive discourse" into the price cap proceeding. ICA had already complained earlier about the RBHCs' use of a process known as ex parte to present substantial new information to the FCC on price caps.

Ex parte filings require interested parties to constantly inspect FCC records since the RBHCs are not obligated to supply the new information to these parties.

The procedure that saved Mass. millions

continued from page 11

ed to us that there was a problem.

What was the next step?

We calculated the number of message units for several stations for a month using the mileage band and pricing information in the White Pages. We compared our call prices with what New England Telephone billed us for. Their numbers were just flat-out wrong.

How did you proceed after you realized the scope of the problem?

We turned to the [National Association of State Telecommunications Directors] for assistance. We asked our colleagues if they had ever run across a problem this large.

Some members had experienced multi-million-dollar overbillings, but not of this type. They did say, however, that a problem of our type and size could exist. And they said the resolution cycle for it would take about three months.

How did you approach New England Telephone with your findings?

We used a teamwork approach. We already had weekly meetings with New England Telephone at which we discuss billing issues, planned services and networking. We brought the billing problem up at a weekly meeting but did not present it as a fait accompli. We told them we had a situation that we did not understand and asked for their assistance. They reviewed our data and noted the problem.

How did you keep the process moving?

We tracked the situation at our weekly meetings. We used explicit deadlines to keep the process moving forward. You have to keep minutes for the weekly meetings. Otherwise, [the deadlines won't be met]. Also, remember, nobody likes surprises, neither your management nor theirs. We made sure we told our management early on what was happening.

What did New England Telephone find?

New England Telephone reported back to us that there was a software bug that accounted for problems with message unit recording in its Bowdoin Street central office.

They told us when they thought the problem started and what impact it had on our billing. They also explained the cause of the problem and told us how it was fixed. New England Telephone was extremely forthright in dealing with the situation.

How long did the process take?

It took five weeks from the time we presented our data to New England Telephone to the time we received the $6 million credit on our bill.

What have you learned from this incident?

Every so often, you have to question and probe the obvious. We questioned why our monthly bill for message units was so high. The answer was, "It's been that way for years."

Just because something has been done a certain way for years doesn't mean it's [correct]. You may learn by talking with your peers that what you thought was obvious might be wrong.

ADCom

Experience is the Difference...
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The data professionals at Blue Cross and Blue Shield of Oregon are so good at processing health insurance claims, Medicare asked them to do a large portion of theirs.

"That meant putting together a complex yet economical network—and fast," according to Teleprocessing Manager Vince Gambino. "We had to tie 13 locations, from Pennsylvania to Texas, into our Portland mainframe via Medicare mandated point-to-point circuits. It had to accommodate on-line interactive communications and massive batch files, and take advantage of the AT&T diagnostic and management features in our existing network."

Gambino and Blue Cross and Blue Shield of Oregon turned to ADCom. Together they developed a network that transmits analog and digital data via T-1 lines with analog and digital extensions that tie into the existing network management system for central site maintenance and control.

Vince Gambino
Blue Cross and Blue Shield of Oregon

"Not only did ADCom get us the equipment at prices attractive enough to put together a successful bid to Medicare," Gambino noted, "no one else could have provided us the exacting support we needed to get the network up and running in time."

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DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

"Every computer manufacturer no longer sells mid-range systems. They now sell servers."

John Logan
Vice-president
Aberdeen Group,
a Boston consulting and
market research firm

Data Packets

Walker Richer & Quinn, Inc. (WRQ) recently released software that enables **Hewlett-Packard Co.'s** HP 3000 minicomputer users to send electronic mail messages across **MCI Communications Corp.'s** MCI Mail E-mail network.

The Mail Messenger/3000 for MCI Mail package is an option to WRQ's Mail Messenger/3000, which resides on a DOS-based microcomputer linked to multiple HP 3000s.

The Mail Messenger/3000 for MCI Mail gateway option enables users of HP's HP DeskManager or WRQ's PostHaste E-mail packages running on HP 3000s to forward messages to the MCI Mail network. Those messages can then be routed to any other users linked to MCI Mail.

The basic Mail Messenger/3000 package enables users of DeskManager and PostHaste running on one HP 3000 to exchange messages with HP DeskManager or PostHaste users on another.

Mail Messenger/3000 for MCI Mail is expected to be released in the fourth quarter. It is a $5,000 option to the basic Mail Messenger/3000, which also costs $5,000.

Advanced Computer Communications (ACC) recently introduced a Transmission Control Protocol/Internet Protocol and X.25 front-end processor board for **Digital Equipment Corp.** workstations running Ultrix.

The firm's ACP 3250 board links a single DEC workstation to a TCP/IP or X.25 wide-area

(continued on page 16)

Alamo builds networked expert system to set rates

TIRS setup reduces need for extra personnel.

By Paul Desmond
Senior Editor

FORT LAUDERDALE, Fla. — Alamo Rent A Car, Inc. has built a network-based pricing system, anchored by a new IBM expert system, that collects data from a variety of sources to help the company make timely, intelligent pricing decisions.

The expert system has helped Alamo keep up with a 25% increase in business over the past year without increasing the size of the staff that determines car rental rates.

Alamo's expert system was developed using The Integrated Reasoning Shell (TIRS), a new IBM program that helps users build expert systems for a variety of applications. To ensure Alamo prices are competitive and within company guidelines, TIRS compares Alamo rates with competitors' pricing data collected via links to airline computer reservation networks and other sources, said Thomas Loane, an Alamo vice-president.

The system generates a list of rate options that Alamo employees use to determine the most profitable deal for the company. This eliminates the need for personnel to ferret through reams of competitors' pricing data.

Alamo has been using TIRS in various test phases for the past six months but now has the system in production mode, Loane said. It came on-line in time to help make the company's pricing team more productive, thereby eliminating the need to hire more staff in order to keep up with the company's growth.

TIRS runs on an IBM Personal System/2 Model 70 outfitted with a "gargantuan" amount of memory and attached to a Novell, Inc. NetWare-based Token-Ring Network, Loane said. Other PS/2s on the Token-Ring are used to collect competitors' pricing data by various means, including links to airline reservation networks and from clerks who call competitors for price quotes, Loane said.

The PS/2 running TIRS is also linked via an IBM 3270 terminal-

"The system generates rate options that Alamo employees use to find the most profitable deal."

▲▲▲

emulation session to an IBM mainframe here, where Alamo's own pricing data is stored.

Over a specified time frame, such as a 90-day period, the system continually compares Alamo prices to its competitors for hundreds of different locations and circumstances, Loane said. It also produces reports that identify instances in which Alamo's pricing is above or below predetermined thresholds as compared to its competition. In such in-

(continued on page 15)

DATA DIALOGUE

BY JOHN HEAFNER

OSINET program helps resolve OSI test issues

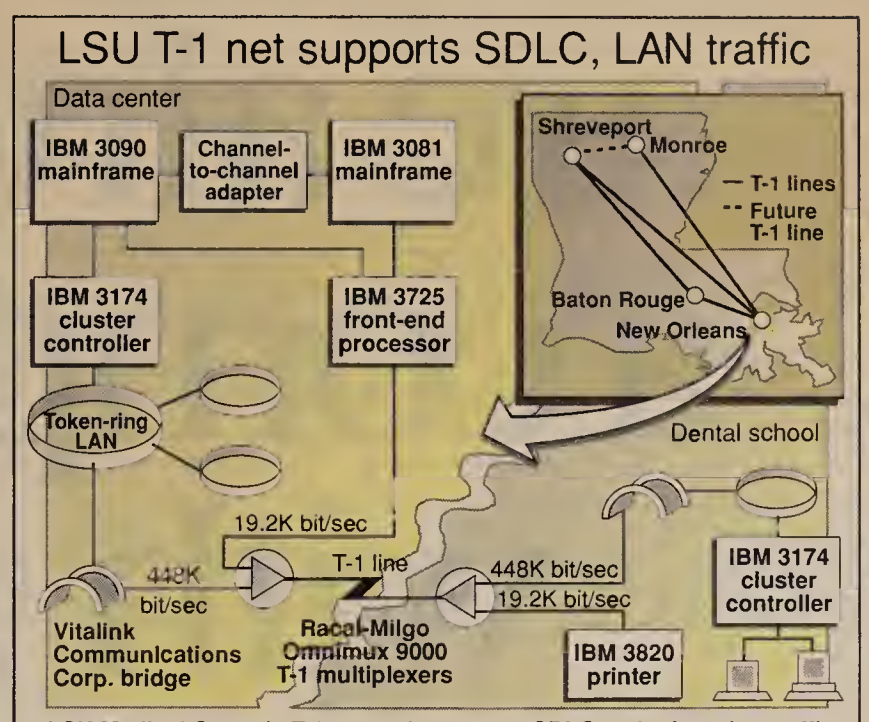
OSINET, a vendor organization developed several years ago to facilitate interoperability testing, has launched a program that provides expert assistance for resolving disputes about Open Systems Interconnection products and interoperability testing.

The OSINET Interworking Consultancy Service (ICS) is a service that helps users and vendors correct errant specifications and tests for OSI products, obtain correct interpretations of them, and isolate interworking problems that arise in a customer's environment or in demonstration preparations.

ICS offers three types of service to its members: Determina-

(continued on page 16)

Heafner is a senior programmer in IBM's OSI Project Office and is IBM's liaison to the OSINET Steering Committee.



LSU Medical Center's T-1 network supports SDLC and token-ring traffic between terminals and microcomputers in Baton Rouge, Monroe, New Orleans and Shreveport.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: LOUISIANA STATE UNIVERSITY MEDICAL CENTER, NEW ORLEANS

LSU T-1 net delivers unforeseen benefit

Medical Center's use of T-1 to interconnect token rings eliminates delay in remote response time.

By Jim Brown
Senior Editor

NEW ORLEANS — Louisiana State University (LSU) Medical Center's T-1 data network is paying some unexpected dividends by providing users at remote sites with subsecond terminal response time equal to that of local host-attached devices.

The response time improvement eliminates a 2- to 3-sec delay remote users were forced to live with every time they requested data from an IBM host in a data center here.

The company installed the T-1 net two years ago primarily to eliminate costly low-speed, dedicated lines.

Within the last year, LSU Medical Center equipped remote sites across the state with 4M bit/sec token-ring local-area networks and Vitalink Communications Corp. bridges, and replaced IBM 3274 controllers with 3174 models that can be attached to token rings. Together, these devices connect 3174-attached terminals and microcomputers to the T-1 network.

A Vitalink bridge receives traffic from cluster controllers and passes it to an on-site T-1 multiplexer, which uses a 448K bit/sec channel on a T-1 circuit to forward the data to the host here. This is a vast improvement over the 19.2K bit/sec channels LSU Medical Center originally carved out of T-1 circuits to support direct links between each remote cluster controller and the data center.

"As soon as we did this, people at remote locations got absolutely the same response time as people who were next to the [host]," said David Troendle, director of computer services for LSU Medical Center. "Once we crossed the line [to T-1], our way of thinking [about networking] changed. And now we've really exploited T-1, especially by using it to interconnect token rings."

When the seven-node T-1 net was first installed two years ago,

"Once we crossed the line [to T-1], our way of thinking [about networking] changed."

▲▲▲

it replaced a costly collection of point-to-point 9.6K bit/sec circuits in LSU Medical Center's statewide IBM Systems Network Architecture network. Those circuits supported Synchronous Data Link Control traffic among IBM 3274 cluster controllers at three New Orleans locations, two Baton Rouge, La., sites and one site in both Shreveport and Monroe, La., to IBM 3090 and 3081 mainframes in a data center here.

While the 19.2K bit/sec channels originally carved out of the T-1 links were faster than the

(continued on page 15)

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AT&T ISDN is working in Transportation:

With AT&T ISDN's Call-by-Call feature, transportation companies are now centralizing control of their dispatch operations and combining various AT&T switched services on the same T-1 pipe. This flexibility means that more calls are being handled with fewer access lines. AT&T ISDN has helped transportation companies save thousands of dollars each month and has moved their businesses into the fast lane.

AT&T ISDN is working in Lodging:

Right now, when their switchboards are all lit up, hotels are using AT&T ISDN to route calls automatically to the next available agent, even if they're in another location. That maximizes their staffing efficiency. Also, with our automatic number identification feature, agents have become more accurate and are saving time, opening the door for more personalized service.

So now that you know how well it's working for your competition, let the advanced technology of AT&T ISDN increase productivity and save money for *your* business today.

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LSU T-1 net has unforeseen benefit

continued from page 13

9.6K bit/sec circuits being replaced, they nonetheless limited response times for remote users to between two and three seconds, while response time to local users was subsecond, Troendle said.

"If you're using 9.6K bit/sec phone lines, it is very difficult to give subsecond response time to remote users," he said.

The response time difference between remote and local users did not become an issue until some local users located in the data center moved to other LSU Medical Center buildings in New Orleans.

"They perceived a big difference in the level of service we were providing," Troendle said.

Anatomy of the net

LSU Medical Center's T-1 net consists of seven Racal-Milgo Omnimux 9000 nodes in four cities.

In New Orleans, nodes are located at LSU Medical Center's dental school, medical school and the resource center — a five-building complex housing administrative offices, the data center and other facilities.

In Baton Rouge, nodes are located at Pennington Biomedical Research Center and LSU's main campus, while others are stationed at an LSU Medical Center graduate medical school in Shreveport and E.A. Conway Hospital, a state hospital in Monroe (see graphic, page 13).

The network enables remote users to gain access to a variety of administrative and business applications, as well as patient information, appointment calendars and medical research notes stored on IBM 3090 and 3081 mainframes in New Orleans, as well as an IBM 4381 in Shreveport.

Net managers at the medical center first discovered the benefit of using token rings to link remote sites to the host about a year ago when the data center had to move to a new building two blocks away.

In order to avoid the headaches of moving a web of coaxial cables supporting point-to-point SDLC links between cluster controllers and the host into the new data center, Troendle said cluster controllers in the old data center were attached to a token ring.

By using repeaters, the token ring was extended to a 3174 in the new data center, and that 3174 was then attached to a 3090 mainframe channel.

Because LSU Medical Center uses a channel-to-channel adapter to link the 3090 and 3081, users on the token ring can pass through the 3090 to access applications and data on the 3081.

Using the token ring meant that only one cable had to be run from the old data center to the new one, thus enabling the LSU Medical Center to eliminate the need for the old coaxial cable.

The addition of 4M bit/sec token rings between cluster controllers and the host enabled users in the old data center to maintain the subsecond response time they were accustomed to when their terminals were attached to 3274s linked directly to the host.

Once the response-time benefit was noticed, token rings were installed in the New Orleans dental school, the Pennington Biomedical Research Center and the hospital in Monroe.

Future plans

The token rings at those sites have been so successful, Troendle said, he plans to install token rings in the Shreveport graduate medical school and the medical school in New Orleans.

Meanwhile, Shreveport users are linked via local cluster controllers to a local 3725 front-end processor that provides access to the on-site 4381. The 3725 is also linked via a 56K bit/sec SDLC channel on the T-1 network to a 3725 front-end processor in New Orleans, which is attached to the 3090 and the 3081.

Users at the New Orleans medical school are attached to 3274 cluster controllers linked via 19.2K bit/sec SDLC channels on the T-1 network to the 3725 in the data center.

Replacing those setups with token rings will not eliminate all of the SDLC traffic, Troendle said.

LSU Medical Center will still use the T-1 net to pass SDLC traffic between the hosts here and IBM 3820 printers in remote locations.

Alamo builds expert system to set rates

continued from page 13

stances, it recommends price changes to maximize profits.

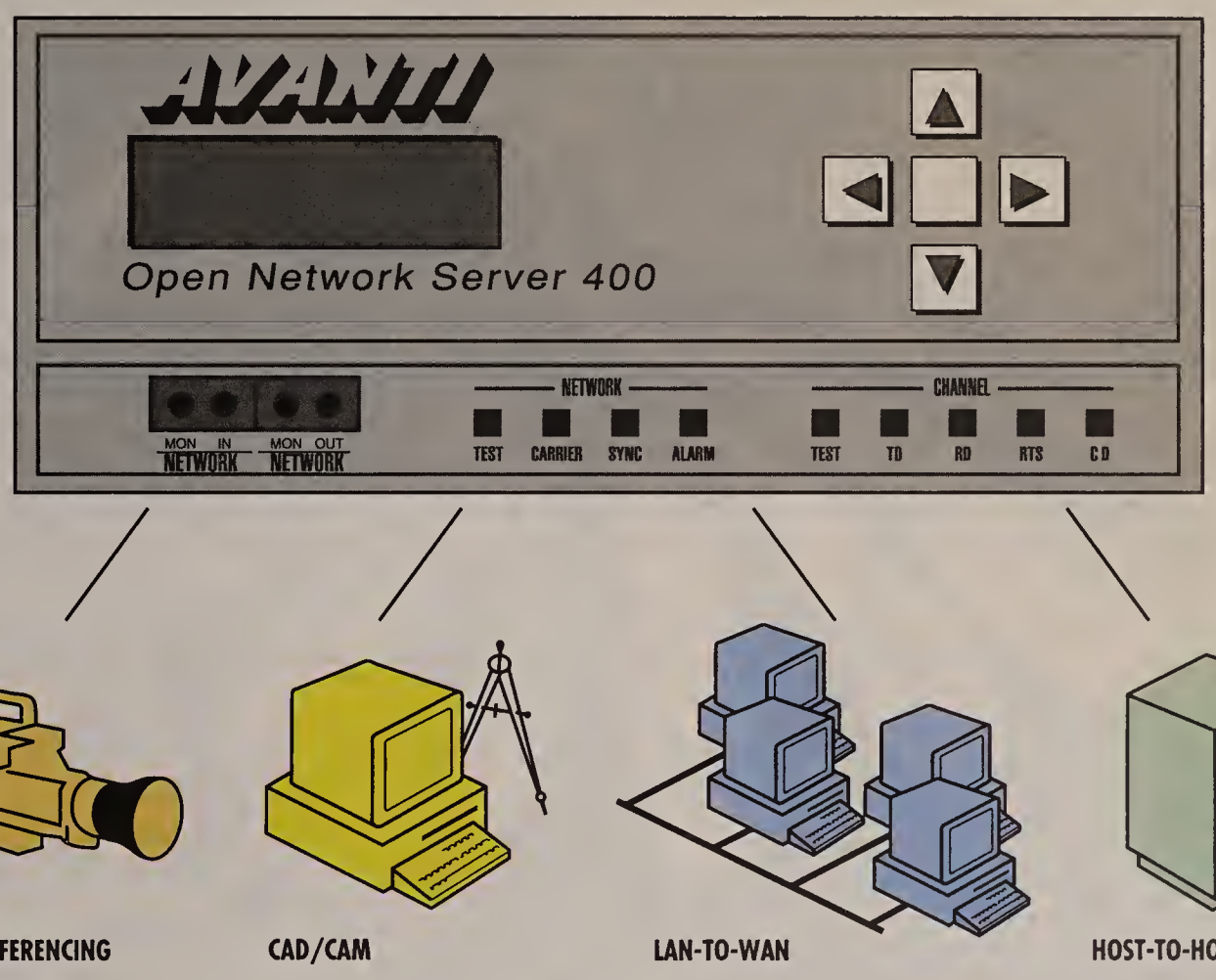
For example, demand for car rentals in Albuquerque, N.M., rises dramatically the week of Oct. 5, when crowds gather for the annual hot air balloon races. "That's the kind of thing that you want to make sure you price intelligently for," Loane said. "There's a tremendous demand for a short period of time."

TIRS will tip off Alamo pricing staff when competitor's prices start creeping up in anticipation of the Albuquerque balloon races, allowing the company to respond accordingly.

"We believe it has significantly improved our ability to price our service," Loane said. "It is very much trusted by the people who use it." The system catches mistakes such as data entry errors that can make Alamo's pricing completely out of line with the competition, he said.

Now Alamo is examining other uses for TIRS, including several network management applications, although Loane declined to detail specifics.

More ports than a Caribbean cruise.



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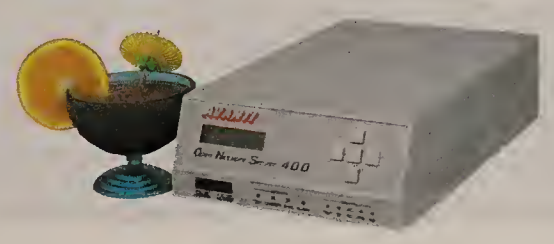

computer communications and CAD/CAM applications. Plus the Avanti ONS 400 provides system performance monitoring on D4 and ESF circuits, front panel keypad and LCD display, front panel bantam jacks and LED's, and loopback commands for easy maintenance. And the ONS 400 complies with Publication 54019A, AT&T's Intermediate Bit Rate Standard for Fractional T1.

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See The FAXNeT Form on Page 33

Data Packets

continued from page 13

net or enables that workstation to act as a WAN gateway for other workstations connected in a local-area network. The ACP 3250 resides in DEC workstations with a small computer system interface bus.

The board has its own processor and has TCP/IP and X.25 protocols stored in an erasable programmable read-only memory module. This off-loads communications protocol processing chores from the workstation to the board.

The board includes a single WAN port that supports transmission speeds over public or private networks at up to 500K bit/sec. It also supports as many as 254 full-duplex switched or permanent virtual circuits. Users can configure the board to support packet sizes ranging from 128 to 4,096 bytes.

The ACP 3250 is available now and costs $5,250.

Republic Telcom Systems Corp. recently announced a new program to upgrade its existing RLX-8 and RLX-16 VXD multiplexers to the 1991 release of the company's N-Series RLX technology, which is the firmware base for Republic Telcom's future software development.

Under the program, users can upgrade to or trade for RLX-8N or RLX-16N multiplexers at discounts ranging from 50% to 60% off the list price for N-series units.

The RLX multiplexers support compressed packetized digital voice, data and facsimile traffic. The N-series offers enhancements over older RLX multiplexers including improved speech quality, the ability to support dual transmission lines for redundancy or increased capacity, and enhanced diagnostics.

The RLX-8, also sold by Timeplex, Inc. as its Link Packetized Voice Subsystem-8, must be traded in for an N-Series multiplexer. Newer RLX-8ii multiplexers can be upgraded to an RLX-8iiN or traded for new RLX-8N or RLX-16Ns.

RLX-16 VXD multiplexers can be field upgraded to RLX-16N units. Prices range from $6,000 to $13,000, depending on configuration.

For more information, contact Republic Telcom at 6150 Lookout Road, Boulder, Colo. 80301, or call (303) 530-8600.

Program helps resolve OSI issues

continued from page 13

tion Service, Reporting Service and Interpretation Service.

At the request of members, the Determination Service provides expert opinion from OSINET as to the cause of an interworking problem. This service may be requested, for example, when the cause for failure to interwork cannot be determined by the affected suppliers after reasonable and substantial effort has been applied to the problem. OSINET determines the cause for interworking failure.

Using the Reporting Service, members may report a deficiency in an OSI specification or test. Need for this service may arise, for example, when two demonstration participants' equipment fails to interwork. In correcting the failure, the participants discover and recognize a shortcoming of a specification or a test that had led to their interworking problem. The shortcomings may be an error or simply the need to clarify some text. OSINET then works through recognized and established channels to devise a remedy.

The Interpretation Service offers the official interpretation of a specification or a test for members at their request. This service may be needed, for instance, when two vendors' equipment fails to interwork. The vendors have established the reason for failure but cannot agree on the meaning of a specification or a test that led to the interworking problem. The service provided here is a clear and concise statement of the specification's intent or the delineation of the expected outcome of a test. OSINET again works through accepted channels to obtain the correct interpretation from the responsible organization.

The ICS data base

OSINET maintains an ICS data base that contains descriptions of problems it has undertaken. It also contains resolutions to those problems in terms of additional or modified OSINET tests that are devised to catch a future occurrence of the same problem. It does not contain information about how affected suppliers and customers ultimately resolved their problem. Currently, the data base is kept in hard copy; later, it may be made available on line.

Upon conclusion of an investigation, a written report is prepared by the experts. It states the initial request and gives the opinion as to the cause of the problem. The report references the relevant specifications, tests and standards that support the opinion but does not identify suppliers or customers by name.

If changes are felt to be necessary to an external group's document, then the report is accompanied by a recommendation to that effect, aimed at the target group.

Also, the report may contain additional tests that were prepared to augment OSINET test suites and catch future related problems.

The experts give the report to the requesting member and to OSINET. It is entered into the ICS data base for future reference. If a recommendation was prepared for an external group, it is forwarded to the group by OSINET.

For more information on OSINET programs and membership, contact Jerry Mulvenna, OSINET chair, National Institute of Standards and Technology, Building 225, Room 8217, Clopper Road, Gaithersburg, Md. 20899, or call OSINET at (301) 975-3631.

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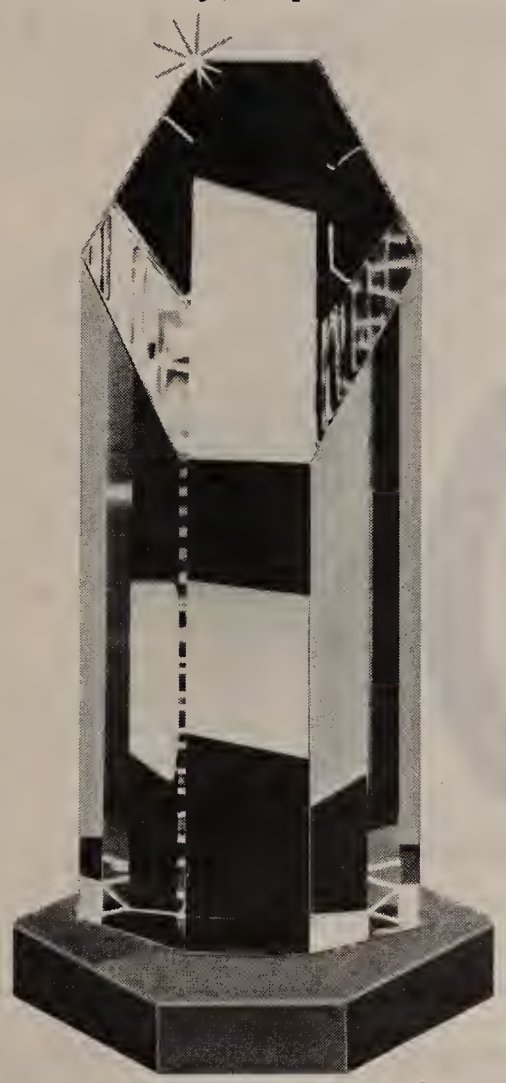

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Worth Noting

"Equipment purchases and installation only account for 35% of the cost of owning a LAN. The remaining 65% is spent on incremental product upgrades, service, maintenance, network management and training personnel."

Kumar Shah
Senior product manager
Proteon, Inc.
Westborough, Mass.

Netnotes

Verdix Corp.'s Verdix Secure Local-Area Network (VSLAN) last week became the first multilevel secure network to receive top endorsement from the National Security Agency (NSA).

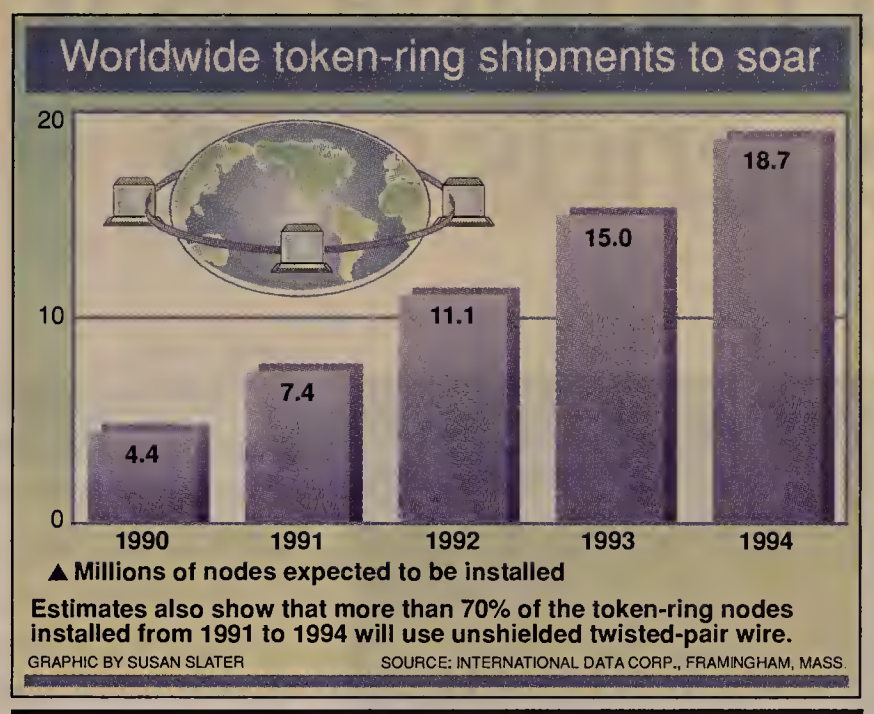
Multilevel security allows users with different security ratings, such as secret or top secret, to operate on the same LAN and access the same data base without compromising the NSA's stringent security requirements.

Because the Verdix VSLAN is the only LAN product with NSA B2 multilevel security protection, government and industry users are likely to implement it widely to satisfy security requirements, according to NSA and Verdix officials.

The VSLAN system consists of up to 128 workstations and a Verdix Network Security Server, which controls and audits the security aspects of the net. The workstations are attached using Verdix interfaces called Network Security Devices. The interfaces are available for a variety of personal computers and terminals.

VSLAN is based on the IEEE 802.3 Ethernet standard and provides Data Encryption Standard encryption of all data transferred on the net.

The announcement of the VSLAN security rating by the NSA's National Computer Security Center was made at a press conference with officials from the NSA and Verdix.



Novell clamps down on illegal NetWare duplication

Initiates legal action against software pirates.

By Laura DiDio
Senior Editor

PROVO, Utah — Novell, Inc. last week said it is stepping up efforts in the courts and on the streets to squelch illegal bootlegging of its NetWare network operating system, which costs Novell more than $100 million a year in lost revenue.

Until recently, the illegal duplication of software has mainly affected makers of popular standalone software packages such as Lotus Development Corp., Microsoft Corp. and WordPerfect Corp. But the network operating system bootlegging business has grown nearly as big and as fast as the local-area network business.

Novell's NetWare, which commands an estimated 55% to 70% of the installed base of network operating systems domestically and 50% worldwide, is the chief target of software pirates.

But the Software Publishers Association (SPA) in Washington, D.C., which tracks copyright infringement issues, has had few instances of piracy of Microsoft's OS/2 LAN Manager, Banyan Systems, Inc.'s VINES and other popular LAN operating system software, according to Mary Jane Saunders, the SPA's general counsel.

"Users are double losers in the software bootlegging game," Saunders said. "They can't get service and support, and they often lose their original investment in the software and have to go out and legally buy the product anyway."

David Bradford, Novell senior vice-president and general counsel, said a very small percentage of Novell's estimated 8,000 authorized value-added resellers are illicitly duplicating NetWare and selling it at discounted prices or bundled with hardware to usually unsuspecting users. Bradford says domestic bootlegging efforts net the rogue resellers tens of millions of dollars in illegal NetWare sales.

The international piracy problem is much more pervasive — especially in Eastern Bloc countries and the Soviet Union — where high technology sales have been the subject of severe restrictions until the recent thaw in the Cold War and the advent of glasnost.

"Domestically, we're starting to stem the tide since the U.S. has stiff penalties on intellectual property theft," Bradford said. "In the last 10 months, we've initiated five lawsuits against alleged NetWare pirates. But in the Eastern Bloc countries, software piracy is rampant and, for the most part, unchecked. For every legitimate copy of NetWare, there may be five to 10 bootlegged copies."

In response, Novell and 11 other software vendors, including Ashton-Tate Corp., IBM and Microsoft, last year formed the Copyright Protection Fund within the SPA.

The 12 companies help finance litigation and lead the enforcement efforts against software pirates for the entire 675 member companies in the SPA organization, Saunders said.

In the past two years, the SPA's Copyright Protection Fund has begun dozens of legal actions involving software piracy against storefront computer dealers, mail order houses, bulletin boards that encourage users to download commercial programs, value-added resellers, training

(continued on page 47)

Latest LAN Manager arrives without OS/2

Users forced to hunt for Version 1.21 of OS/2 to operate Microsoft's LAN Manager Version 2.0.

By Susan Breidenbach
West Coast Bureau Chief

SAN FRANCISCO — Version 2.0 of Microsoft Corp.'s LAN Manager was delivered to distributors on schedule Aug. 15 but arrived with a catch: It doesn't include the requisite Version 1.21 of OS/2, which must be purchased separately from one of Microsoft's hardware OEMs.

Most of the key microcomputer manufacturers have promised to have the new release of OS/2 out by the end of this month, and a few, including Compaq Computer Corp., have already released it. But even assuming the general availability of Version 1.21, the two-step purchasing scheme is not being received well by Microsoft's new Network Assistant resellers.

For one, the resellers are accustomed to handling Novell, Inc.'s NetWare, which is sold as a complete network operating system in a single package. They also have become accustomed to seeing the earlier versions of LAN Manager bundled with OS/2, both in the shrink-wrapped boxes sold by OEMs such as 3Com Corp. and Ungermann-Bass, Inc. and in Microsoft's own software developer kit version.

"It's rather clumsy right now," said Marshall Olsen, president of LAN/Mind, Inc., a veteran NetWare reseller in Chicago that has also become a Microsoft Network Assistant. Olsen said he has three orders for LAN Manager from customers and now has to figure out how to get the necessary copies of OS/2 Version 1.21.

"Either the clients have to purchase 1.21 from their hardware suppliers or we have to find it for them," Olsen added. "Logistically, this wasn't well thought out by

(continued on page 47)

Phaser to offer NetWare router for SNA networks

By Susan Breidenbach
West Coast Bureau Chief

SAN FRANCISCO — At NetWorld '90 in Dallas next week, Phaser Systems, Inc. is scheduled to unveil software that will enable users on local-area networks running Novell, Inc.'s NetWare 2.15 to route NetWare packets across existing IBM Systems Network Architecture backbones.

The NetWare SNA Router 2.15 is an Intel Corp. 80286-based version of Phaser's previously announced router for NetWare 386. Both use IBM's peer-to-peer LU 6.2/PU 2.1 protocol.

The new router lets users on geographically distributed NetWare 2.15 LANs exchange messages, access one another's resources via an SNA backbone or manage remote NetWare LANs from a central site.

"The new NetWare SNA Router 2.15 from Phaser is a critical component users need to manage NetWare LANs transparently and effectively over existing SNA nets" said Darrell Miller, executive vice-president of marketing and services at Novell.

The router runs on a DOS workstation with a synchronous or token-ring interface and acts as a dedicated SNA gateway. As a true peer-to-peer LU 6.2 application, the routing software requires no mainframe component.

Together, the 2.15 and 386 routers were designed for large corporations that have IBM mainframes and multiple NetWare LANs. The new lower end 2.15 version is aimed particularly at businesses that have many small branch offices running NetWare applications on LANs.

Any network application that runs across a standard Novell internetwork bridge — such as electronic mail, distributed data bases, and archiving and print spooling utilities — is supported by the router. Also, 3270 applications running on the LAN workstations are supported concurrently over the same gateway.

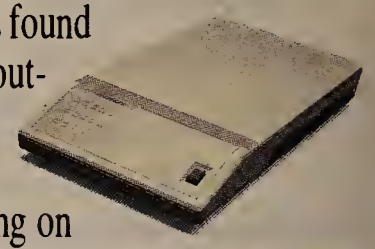
The 2.15 and 386 versions are interoperable and are compatible with Phaser's implementations of NetWare that run on IBM mainframes: NetWare for MVS and NetWare for VM. These two products let NetWare LANs serve as front ends for mainframe data entry and other applications.

NetWare 2.15 should be available in the fourth quarter of this year. It costs $2,995 per router, with a router required for each LAN tied to the SNA backbone.

NEC modems keep information moving as if your life depends on it.

In a 911 emergency, to risk a communications breakdown is to risk a life. So if you don't want to take any chances, make sure your modem can handle the pressure in a crisis.

In Florida, NEC's I Series Intelligent Chassis System is now helping coordinate the life-saving efforts of Lake County's 911 services. The county chose the system after tests found NEC's I-Chassis modems outperformed others. And they've proved their round-the-clock reliability by being on the job there for more than a year without a single failure.



Since NEC modems are designed to rapidly and accurately transmit huge volumes of data, Lake County's 911 operators can now quickly pinpoint accident locations, provide traffic instructions, find patient medical records, and dispatch back-ups when needed. And because NEC's Dual Modem Card links 911's control center to NEC Dial-up Modems in remote locations, Lake County feels it has found the best data networking solution attainable.

Each individual I Series Chassis supports a wide variety of applications and products. These include synchronous and asynchronous operation in dial-up or leased line networks. Line speeds ranging from 300 bits/s to 56k bits/s with both analog and digital capabilities. As well as compatibility with CCITT standards such as V.32 and V.42/bis. Plus, the system's built-in flexibility eliminates product obsolescence by making it easy to add, mix, and match other chassis and data communications devices as network requirements change.

No matter what business you're in, you need a modem that can keep facts and information on the move without causing a crisis of confidence. So choose wisely. Choose NEC's I Series Intelligent Chassis System and Network Manager. For a free assessment of all your data networking needs, **call (800) 222-4NEC.**

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NEC

See The FAXNeT Form on Page 33

Worth Noting

"There is an unspoken concern among men that taking paternity leave is not going to move your career forward."

Max Messmer
Chairman
Robert Half International
Menlo Park, Calif.
Commenting on a survey that shows that 31% of Fortune 1,000 firms offer paternity leave but only 1.3% of eligible men use it

Association Watch

Common, the IBM mid-range computer user group, will hold its annual fall conference Oct. 29 to Nov. 2 in Cincinnati.

The conference, which will celebrate Common's 30th anniversary, will have more than 900 workshops for IBM users, including sessions on A Real-Time Interface Coprocessor and Reduced Instruction Set Computing. George Conrades, IBM senior vice-president and general manager of U.S. marketing and services, will present the keynote address on ways to compete in today's global marketplace, and he will disclose plans for new IBM services, multimedia applications and global networks. More than 4,000 people are expected to attend. To register, call (312) 644-6610.

The **Communications Managers Association** will hold an educational meeting Sept. 12 in New York.

The morning program will include a presentation by Robert Montgomery, president of the Open Systems Interconnection/Network Management Forum, who will discuss his group's goals.

Also, Michael Kennedy, a consultant at Arthur D. Little, Inc., will discuss the impact of local-area networks on corporate computing architectures.

In the afternoon, Lee Selwyn, president of Economics and Technology, Inc., will discuss regulatory developments on the state and federal levels.

To register, call (201) 766-3824.

NCUG waives fee to boost membership

By Bob Wallace
Senior Editor

NOVI, Mich. — The National Centrex Users Group (NCUG) said recently it is waiving its $75 annual membership charge for Centrex users in a move designed to expand its membership.

NCUG, which has 800 member companies, was established in 1987 to provide Centrex users with a voice in the development of Centrex-supporting equipment and the deployment of new Centrex features and services. The group also serves as a forum for the exchange of ideas and discussion of common needs among Centrex users.

Jim Yeip, senior communications analyst for Federal Mogul Corp. in Southfield, Mich., said NCUG companies use almost two million of the seven million Centrex lines installed today.

"We're in a growth stage," he said. "Our ultimate goal is to reach three million lines."

The NCUG's annual conference will be held Nov. 6 to 9 at the Town & Country Hotel in San Diego and will feature presentations from such Centrex users as USAir, the University of Texas in Houston and 3M Corp.

For more information, contact Jim Yeip at (313) 354-8913, or write the group at P.O. Box 319, Novi, Mich. 48050.

GUIDELINES

BY ERIC SCHMALL

User telecom woes not always technology-based

Network managers should be wary when end-user groups complain that their phones or communications systems are not working right.

Unless a user complains about an obvious technical problem — such as the lack of a dial tone or extremely slow network response time — chances are that it is not something the network department can either assume responsibility for or fix. Often, the source of an end-user group's problem has more to do with staffing levels and policies or procedures in the user's own department than with malfunctioning or poorly designed voice or data systems.

Staffing level problems

For example, the manager of a customer service group may complain that the automatic call distribution (ACD) system is irritating customers by putting them on hold for long periods of time.

While the customer service manager may think the ACD is failing, a careful review may reveal that the customer service group needs to increase its staff.

In another case, a unit chief may grumble that his clerical people can't identify whose phone is ringing when they use their call pickup feature. An investigation of the problem, which would include detailed discussions with the unit chief and the staff, may reveal that staffers don't understand how to use the PBX call forwarding feature or how the group might redistribute call coverage to answer calls more efficiently.

In these two examples, the root cause of the user's problem was a personnel or procedural issue, not something that could be resolved with a new piece of telecommunications hardware.

When an end-user group issues a complaint, net managers should be ready to carry out a protracted dialogue with users and conduct a comprehensive study that uncovers the real source of the problem.

Tact is of the essence

Network managers shouldn't expect users to be grateful for this information. Users will often refuse to accept the network department's analysis of the situation if it differs from their own and demand that the matter be taken to a higher authority in the company for review.

(continued on page 24)

Schmall is a network systems manager for an insurance holding company.

MANAGEMENT PROFILE

IS security exec tells of risks, strategies

Q&A The last two years have been busy for information security managers. Events such as Hurricane Hugo, the San Francisco earthquake, virus attacks and, most recently, a massive power outage in downtown Manhattan have focused even more attention on the importance of protecting corporate data.

A central figure in the information security arena is Sally Meglathery, a manager of data security, audit and contingency planning at a major New York firm and president of the Information Systems Security Association, Inc. (ISSA), an international nonprofit group of security managers.

Network World Senior Writer Wayne Eckerson recently spoke with Meglathery about the challenges facing network and information systems (IS) managers today.

Is the threat from computer viruses overstated?

Yes, unless it happens to you, and then it's not stated enough. If a virus hits you, it's a real pain. You can never recover immediately because the virus comes back repeatedly. Like an infection in your body, it takes a long time to really get rid of it.

Are there adequate protections available for viruses?

Yes and no. If you've done nothing to protect your systems from a virus and haven't backed up your files, all the antidotes in the world won't help. But if you have adequate backup, there are [antiviral packages] out there that can help you recover. Real protection against viruses, however, depends on the procedures and controls you implement.

ISSA President Sally Meglathery talks of net security concerns.

What is the biggest threat to IS security?

It still remains honest employees doing stupid things. Many employees have a lax attitude toward security. They give away their password or tokens because their friends or colleagues forgot theirs and can't access the data they need from their terminal.

While these people aren't acting maliciously, they create security exposures for their companies.

Also, many companies fail to properly install security software packages. While they may think they are protected, they really aren't. Other companies don't do a good job of designing security systems and procedures, leaving them vulnerable to security breaches.

Are threats other than viruses unjustly ignored?

It really depends on top management and the resources they are willing to allocate to protect their company's data.

The one benefit of the virus attacks and disasters that have happened in the last couple of years is that they have focused top management's attention on the need for data security.

Disasters usually make senior executives more willing to discuss security issues and allocate additional resources. I've been

(continued on page 24)

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User woes not always technology-based

continued from page 21

These users may also become defensive when a network group suggests that they aren't running their unit efficiently, and they may even accuse the network group of trying to cover up the fact that the phone system is poorly engineered.

Once things deteriorate to this point, there's little chance that the problem can be resolved quickly. To avoid this kind of impasse, network managers must take several steps.

The first thing net managers need to do is train their staff how to recognize when a phone problem truly exists and when it does not. This means net staffers not only have to be intimately familiar with the capabilities and limits of their voice and data systems, but they also must be able to analyze a unit's work flow and understand how communications systems impact that flow.

In addition, a network analyst must be adept at interviewing people, listening to their concerns and arranging information in a coherent pattern.

Net managers then need to master the art of diplomacy. Users are typically reluctant to admit they've made a mistake, so network managers have to carefully steer users to discover the true source of their own problems. This requires patience and sensitivity to users' feelings as well as a gentle but resolute determination to point them in the right direction.

Adept network managers will be able to convince users of their errors without engaging in a protracted public debate.

Finally, network managers need to offer suggestions on how user policies or procedures might be improved to work in concert with network systems. Since organizational activities are becoming so deeply intertwined with telecommunications systems, network managers can no longer walk away from problems that may not be overtly technical in nature.

Network managers need not take the blame for all problems users attribute to their phone systems. But it takes tact, diplomacy and persistence to resolve these problems in a way that preserves an open and cordial relationship between the network department and end-user groups. ◪

IS security exec tells of risks, strategies

continued from page 21

able to capitalize on well-publicized disasters to gain approval to address other security issues.

In light of the New York power outage, how would you rate the disaster recovery plans of most companies?

To some degree, marginal. A number of companies had problems with their power generators; they ran for a few days and then collapsed. These companies hadn't adequately tested their generators. Everyone who had a problem with their generator will be looking into [disaster recovery] much more carefully.

What are the biggest security mistakes users make?

Some managers are too enthusiastic about implementing security measures. Good security should be transparent to the users until they do something wrong, such as try to access something they aren't supposed to access.

But forcing users to change passwords every week, for example, almost undermines security because users tend to ignore the procedures. You have to carefully balance between implementing reasonable security measures and being overzealous.

What's the most important thing network managers can do to assure the security of information systems?

[They need to take] data security seriously. They need to recognize what data can be compromised, and they have to sell top management on the need for network security.

Fortunately, many companies are starting to pay greater attention to network security, especially if they have dial-up lines. This is especially true in the banking industry. Banks typically are the first to test new data and network security controls, and they are big users of message authentication and encryption.

Are local-area networks particularly vulnerable to security problems? What should users be doing to protect LANs?

They are not more vulnerable than other things, but they are better able to propagate a virus.

It's critical that companies take preventive measures to avoid exposing themselves to undue risks. This means protecting passwords, backing up data more frequently and providing a good audit trail.

How much training should companies provide end users to ensure adequate security?

Any company that has a computer has a

Good security should be transparent to the users until they do something wrong.

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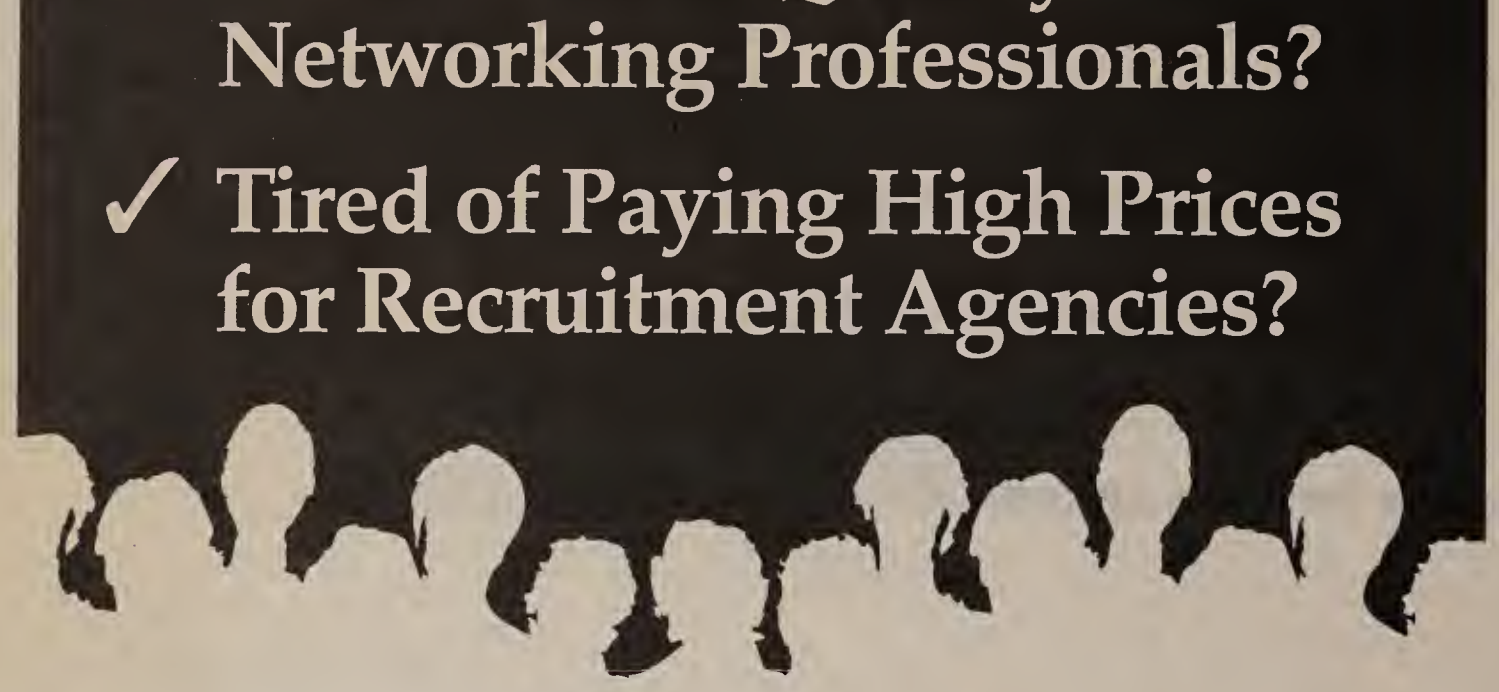

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esponsibility to make employees aware of he exposures they face with computers. Every company needs a security awareness program.

Fortunately, they don't have to develop their own. The U.S. Office of Personnel Management developed a good program for government agencies that it is also making available to any company that requests it. This program contains slides, videotapes and other training aids.

What are the critical components of such an awareness program?

You have to keep reminding users about the importance of adhering to security procedures. This can be done by passing out newsletters and getting employees to sign a statement that says they understand it is their responsibility to maintain the secrecy of their password and inform management whenever they suspect a security breach.

While security doesn't add to the bottom line, it keeps it from being eroded through unanticipated losses.

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How many large user organizations really experience security problems, and how much money do they really lose?

That's hard to tell. I've read that security breaches cost companies $550 million a year, but I don't think anyone really knows. Besides, a lot of companies don't report losses from security breaches because of the negative publicity that usually follows.

How difficult is it to justify spending money on information security when upper management views it as an overhead cost that doesn't add to a company's bottom line?

Data security is easy to cost-justify if you do it according to risk. While security doesn't add to the bottom line, it keeps it from being eroded through unanticipated losses.

Companies have to evaluate how much it's worth to protect mission-critical data. Once they see the risks, they are usually willing to allocate the necessary funds.

Do you think that the sentence levied against Robert Morris, the Cornell University student who brought down the Internet network, was strong enough? (Morris, who faced a maximum penalty of five years in jail and a $250,000 fine, was sentenced to three years' probation, a $10,000 fine and 400 hours of community service. He was not ordered to pay restitution to Internet users.)

I'm torn. I think he is a nerdy kid who shouldn't be imprisoned for a long period of time. On the other hand, I don't think we should ignore what he did because that sends the wrong message.

The best thing they could have done is to put him to work developing defenses against adventuresome hackers. I think a lot of professors are guilty of encouraging hackers in the name of fostering creativity. I think it would be much more creative to encourage kids to establish defenses against viruses.

Is the establishment of the Electronic Frontier Foundation by Mitch Kapor a setback to information security at large companies?

It's funny that the same guy who wants to set up a fund to defend the rights of computer hackers doesn't hesitate to go into corporations and sue them for stealing his software.

Apparently, Kapor recognizes theft when it affects his software but not when it affects others.

What steps, if any, is your group taking to tighten or shape federal or state laws that could dissuade potential hackers from stealing or destroying mission-critical data?

We set up a committee to explore ways of working within the federal and state governments when legislation regarding data security is being considered. While nonprofit tax laws prevent us from lobbying, we can still influence legislation by providing expert testimony and helping legislators draft bills. We want to be the organization the government thinks of when it does any kind of computer security legislation.

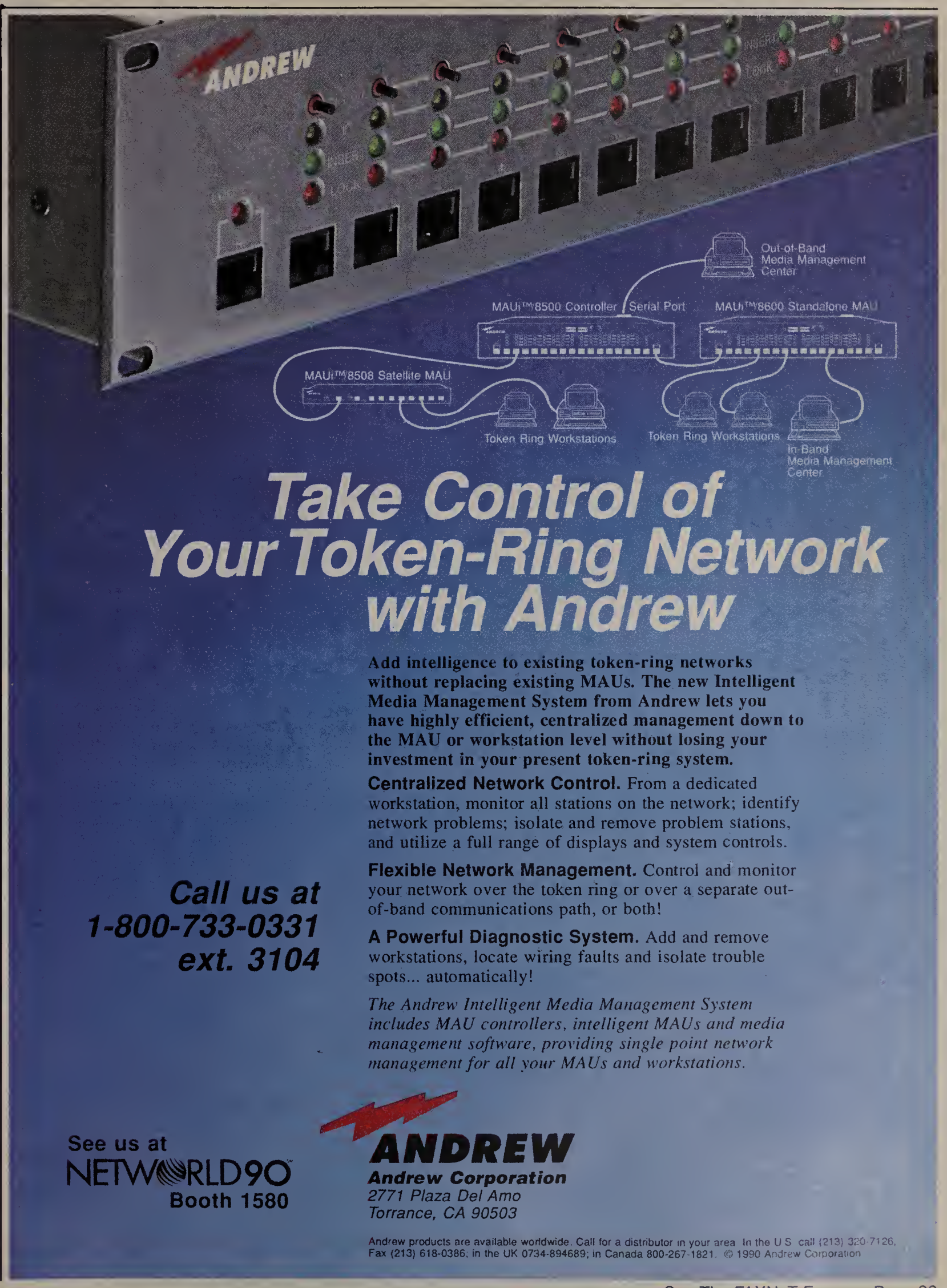
We hear a lot about threats to data networks, but what are the big problems with voice nets?

Credit cards are the biggest problem. Evidently, some kids in New York are using binoculars to read the calling card numbers of people who are making calls at pay phones. Phone companies have had to write off hundreds of thousands of dollars of bad credit card calls as a result.

In what way will the information security manager's job change in the coming decade?

If you look at the economic situation, they will probably have to do more work with less resources. So it will be challenging.

Also, organizationally, security may become more decentralized. There will still probably be an overall coordinator at the corporate level, but as data processing goes out to the end user, data security will follow.



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NETWORLD 90℠ DALLAS

September 10-13, 1990 • Dallas Convention Center

NetWorld 90 Dallas has moved to a site almost as large as Texas — the Dallas Convention Center. More than 400 exhibitors will showcase the latest technology that links your information systems together, from LANs in the corner office to strategic networks that span the globe. NetWorld 90 Dallas needs no further introduction; the show has become the industry's hottest high technology event, according to exhibitors and attendees alike!

Professionals do need to make the right connections in order to succeed in business, and planning makes the difference in finding the solutions for your business needs.

Mark your calendar now to attend the world's most extensive event on computer connectivity, product technology and education. The highly regarded NetWorld seminar series begins on Monday, September 10, with the NetWorld product and services exposition opening on the 11th and continuing to the 13th. For your full attendee program guide or information on exhibiting in NetWorld, please call 1-800-444-EXPO.

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Worth Noting

"There are so many little things [involved in building an international network] that unless you want to take responsibility for all of them, it really makes sense to go with a single-source vendor."

James Shroads
Director of MIS
Transammonia, Inc.
New York

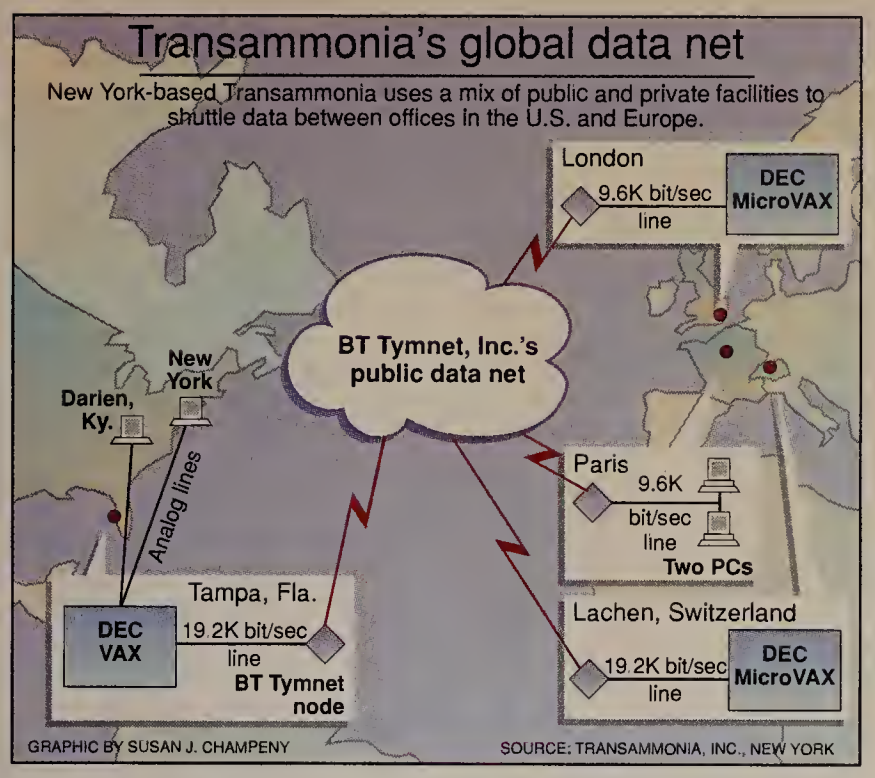
World News

The La Hulpe, Belgium-based **Society for Worldwide Interbank Financial Telecommunications (SWIFT)** last week announced plans to use Stratus Computer, Inc. fault-tolerant XA2000 minicomputers as the basis for an X.400-based messaging service the international bank communications consortium plans to offer by the end of 1991.

The new service will be dubbed Interbank File Transfer (IFT). The service will enable SWIFT subscribers to send up to 2M bytes of data to one another in a single transmission over the SWIFT net. Users will be able to send any information over IFT as long as the data is packaged into an X.400 envelope and sent from an IBM Personal System/2 equipped with IFT software.

Information will flow from the PS/2 via dedicated or dial-up links into local SWIFT nodes. SWIFT will then route the message via its X.25 packet-switching network to a Stratus XA2000 in a SWIFT processing center just outside of Amsterdam. The Stratus computer will route IFT messages to their final destination on a store-and-forward basis.

A SWIFT spokesman said the service will expand the consortium's functionality by making the SWIFT net more flexible. Currently, SWIFT can only transmit messages that are formatted according to specific standards.



User hands fax, Telex traffic to BT Tymnet

Transammonia improves links between European offices and U.S. host via new flat-rate X.25 service.

By Barton Crockett
Senior Editor

NEW YORK — Transammonia, Inc., an importer and exporter of chemicals and fertilizers, recently cut over an international network based on public data net facilities that has enabled the company to improve communications with remote sites without inflating net costs in the process.

By using a new X.25 packet-switching service based on a flat-rate pricing plan from BT Tymnet, Inc., an international value-added network carrier in San Jose, Calif., Transammonia is eliminating costly internal Telex and facsimile transmissions and giving European offices direct access to a corporate host in Tampa, Fla.

This access lets the European offices log transactions directly onto the corporate host, rather than relying on U.S. personnel to interpret Telex and fax messages and key them into the host.

Transammonia, based here, tallied sales of $1.1 billion in the fiscal year ended May 1, 1990. Late last spring, the company cut over a network based on BT Tymnet, Inc. public data net facilities that lets offices in Lachen, Switzerland, London and Paris exchange data and electronic mail with one another and with the corporate host in Tampa.

The network also allows European users to communicate with company offices in Darien, Ky., and New York since these locations are linked to the Tampa host by dedicated analog circuits and use the Digital Equipment Corp. VAX minicomputer as their CPU (see graphic).

Phasing out Telex

According to James Shroads, Transammonia's director of MIS, the primary advantage of this network is that it makes it easier for European users to access a critical business application running on the VAX in Tampa. That homegrown application, the Trading and Traffic Administration System, tracks company commitments to buy, sell and ship chemicals and fertilizers.

> Transammonia is eliminating costly internal Telex and facsimile transmissions.
>
> ▲▲▲

Each of Transammonia's offices are supposed to post records of business transactions to this software, which is used by company officials to audit operations and ensure that proper arrangements are made to transport goods and obtain financing.

Previously, Shroads said, European employees had to Telex or fax records of business transactions to employees in the U.S., who then had to key the data into the application.

Shroads said relying on Telex and fax was costly, error prone

(continued on page 30)

Satellite service makes it a small world for Disney

Officials have access to bandwidth on demand.

By Walter Sweet
West Coast Correspondent

LAKE BUENA VISTA, Fla. — Walt Disney Co. is using France Telecom International's new Bandwidth On Demand satellite service to support videoconferencing between sites here and in France.

Vista United Telecommunications, which provides telecommunications services to Disney World, installed the service to eliminate constraints imposed by another videoconferencing service. The new service is proving especially helpful to Disney officials overseeing the design and development of a new theme park outside Paris.

"It's helpful to do things like that via satellite, rather than having to travel," said a Vista United spokeswoman. "This is going to be good for us."

The on-demand service enables Disney officials to hold spur-of-the-moment videoconferences, which wasn't feasible with the former service supplied by France Cables & Radio (FCR), a France Telecom subsidiary.

Although Disney struck a deal with FCR so that it would not have to use a dedicated circuit, it did have to reserve a meeting time two days in advance and pay for a minimum of 30 minutes of transmission time.

The satellite-based Bandwidth On Demand service allows users to obtain international satellite capacity a few minutes before they need it by using a personal computer to make reservations by dialing into the carrier's network operation center ("U.S. users get on-demand satellite links to France," *NW*, May 28). Because the billing time is broken down into smaller increments, France Telecom claims the new service is less expensive than maintaining a dedicated link.

France Telecom said Disney should expect to save at least 20% using the new Bandwidth On Demand service.

France Telecom said the service should save money for other companies that use satellite services for less than two hours a day. The company has proposed charging approximately $175 an hour for a 56K bit/sec link to $2,218 an hour for a 1.92M bit/sec link. Final tariffs must be approved by the International Telecommunications Satellite Organization, which is marketing the service to carriers worldwide.

France Telecom said charges for a dedicated 56K bit/sec leased-line link start at $4,000 a month and can run as high as $31,000 a month for higher bandwidth.

Without the Bandwidth On Demand service, users would need dedicated transatlantic circuits, but with it, users are only billed for satellite usage in 10-minute increments.

"I know Disney was really excited about [the new service]," said Gabriel Sidhom, a spokesman for France Telecom. "They don't have to rent a line and keep it running all the time, and they pay smaller fees."

BellSouth gets nod from New Zealand for PCN plan

By Ellen Messmer
Washington Correspondent

WELLINGTON, New Zealand — New Zealand's Commerce Commission recently granted a radio spectrum license to BellSouth International, Inc., paving the way for the carrier to build a personal communications network (PCN) in New Zealand.

The addition of competition to the market is expected to spur rate cuts and network upgrades by Telecom Corp. of New Zealand, Ltd., a state-owned telephone company that has a stranglehold on the market.

Ameritech and Bell Atlantic Corp. recently announced plans to buy into New Zealand Telecom as part of a massive privatization effort now under way. Observers see the influx of U.S. carriers as a sign that services will mature and competition will encourage the rollout of advanced offerings.

BellSouth International will initially compete head-to-head in the cellular market against New Zealand Telecom, which currently has the mobile car phone market to itself.

The digital cellular network, planned by BellSouth International for completion in mid-1992, will offer users portable handsets and mobile cellular car phones.

BellSouth International, a

(continued on page 30)

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User hands fax, Telex to BT Tymnet

continued from page 27

and kept company records as much as 48 hours behind actual business commitments.

An alternative method was to have the European offices use personal computers and international dial-up circuits to load data directly into the corporate host. Shroads said this method was seldom used because of the difficulty maintaining international dial-up links to the U.S. and a lack of personal computers and modems in the European offices.

By using the BT Tymnet facilities, Shroads said Transammonia has been able to have European business transactions immediately loaded into the host in Tampa, thereby improving management.

"The network could be justified on this application alone, exclusive of the fact that communications have improved because we now have access to electronic mail, which we didn't have before," he said.

Shroads said this extra functionality has been added at basically no additional cost to the firm. Previously, Transammonia was spending more than $6,000 per month on internal Telexes and faxes, and $2,000 per month for international telephone service used to support dial-up access to the corporate host, he said.

These expenses now have been eliminated, Shroads said. In addition, Transammonia has been able to reduce its $6,000-per-month expenditures on external Telexes by about a third, he added. Now the company routes Telexes through the BT Tymnet network to the Transammonia office either closest to the final destination or with the lowest Telex transmission charges.

In all, these expenditure reductions have totaled just under $11,000 per month. Transammonia is paying slightly more than $11,000 per month for BT Tymnet services. This means the company has been able to vastly improve net services with only a marginal increase in expenditures.

Transammonia's new network is based on BT Tymnet's new XLink Express service that allows users to send virtually unlimited quantities of data over the public data net for a fixed monthly fee. Shroads said if BT Tymnet was to charge his company for volumes of characters transmitted, which is the traditional approach, his expenditures would be about 50% higher.

Shroads added that Transammonia had considered interconnecting these offices via leased lines. But doing so would have required adding networking personnel to offices in Europe, which Shroads said Transammonia was not prepared to do, particularly given the fact that voice traffic could not be economically bundled onto this network.

By using BT Tymnet services, Shroads said Transammonia is able to maintain the entire network using only the six to eight employees in its U.S.-based MIS group.

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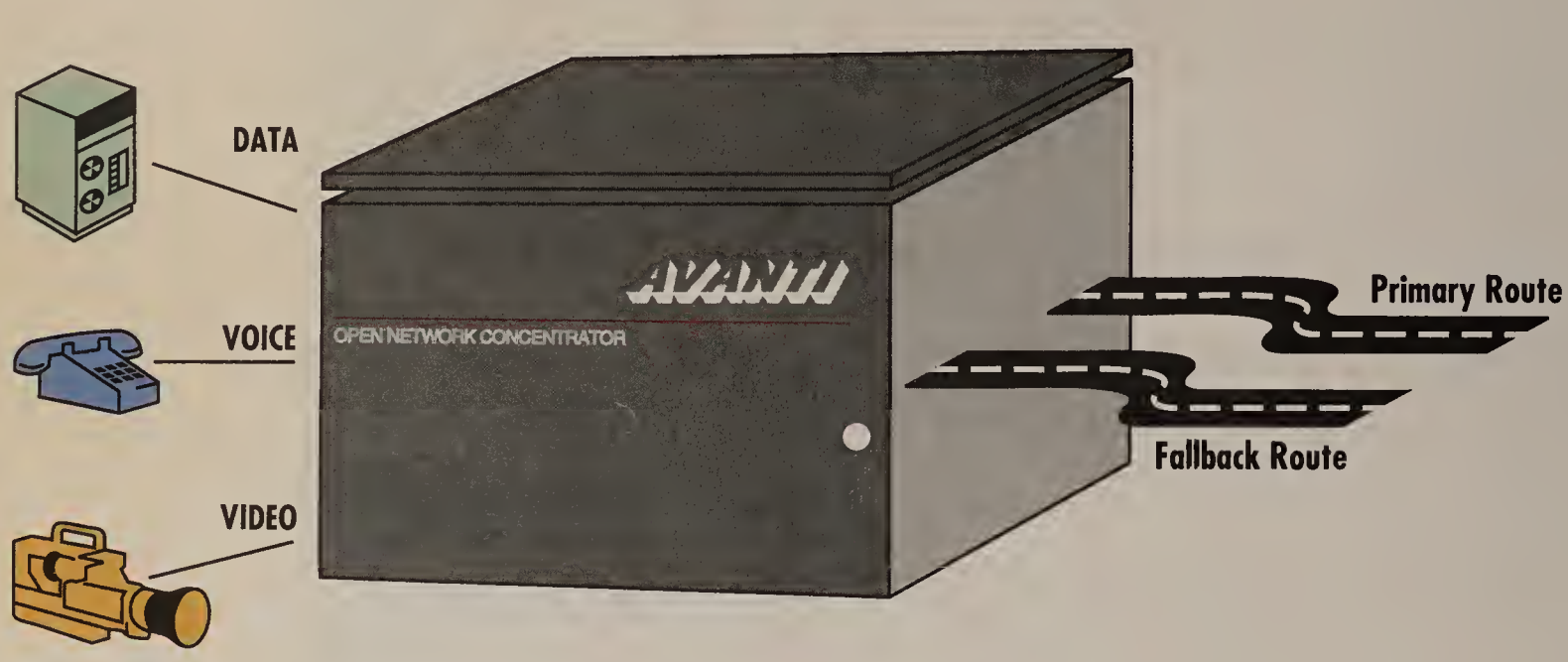

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See The FAXNeT Form on Page 33

BellSouth gets nod from New Zealand

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subsidiary of BellSouth Enterprises, Inc., plans to build its New Zealand digital cellular network in conformance with the emerging European standard, Group Speciale Mobile (GSM).

The GSM standard is considered superior to the competing PCN standard, Digital European Cordless Telephone (DECT), because DECT is not cellular and does not support handoff from node to node, said Berge Ayvazian, vice-president of research and consulting at The Yankee Group, a Boston consultancy. GSM will permit unlimited geographic coverage, while DECT is limited mainly to urban areas.

One reason BellSouth International selected GSM is because Australia is on the verge of endorsing the GSM standard, according to Jim Hobbs, chief strategist for BellSouth Enterprises, Mobile Services.

Once Australia and New Zealand have GSM systems, the portable handsets will function equally well in both countries because of the roaming capability in GSM.

BellSouth International said it believes GSM will provide the platform for advanced PCN services still being developed — such as integration of PCN into Integrated Services Digital Networks.

But the initial offering to users will be cellular car phones and portable pocket-size handsets, Hobbs said.

Although a New Zealand Telecom spokeswoman said the company welcomes competition, the company's older analog system will be a step behind the modern digital system proposed by BellSouth International unless upgrades are made.

The New Zealand Telecom spokeswoman said the company's analog cellular net, operating at 850 MHz, may be converted to digital in two years, but she acknowledged that this would not occur before the new BellSouth system is in place.

GSM will likely be the standard that New Zealand Telecom selects as well.

BellSouth International won radio spectrum allocation in both the 890- to 897-MHz and 935- to 942-MHz range through a bidding process conducted by the New Zealand Commerce Commission.

BellSouth International, having started to design the New Zealand PCN, is now evaluating base stations, base station controllers and switches from equipment manufacturers including Alcatel, Inc., Ericsson, Matra S.A., Motorola, Inc. and Siemens AG.

Hobbs noted that the open GSM standard allows a user to mix and match vendor models of switches and base stations.

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

Brooktrout fax board connects to T-1 line

Brooktrout Technology, Inc. recently introduced an interface for Intel Corp. 80386-based personal computers that allows users to send and receive facsimiles over a directly attached T-1 line.

Targeted at fax-intensive users such as service bureaus, the **TR112T1** works with channel bank emulation cards that reside in the same personal computer and terminate a T-1 line. The TR112T1 and channel bank communicate over a ribbon cable.

The channel bank card enables a user to support 24 fax channels over a T-1 line.

By contrast, typical personal computer fax cards, including Brooktrout's TR112, have a loop-start interface to a telephone line that requires each fax port to have its own telephone line. If users want to connect their fax card to a T-1 line, they need an external channel bank.

But by building into the card an interface to internal T-1 channel banks, Brooktrout has enabled users to support on a single T-1 line as many as 24 fax channels, each taking up one of the T-1 line's DS0s.

The TR112T1, like the existing TR112, has two fax channels. By populating an Industry Standard Architecture computer with 12 TR112T1s, a user could utilize all 24 T-1 channels.

TR112T1 comes with drivers for Unix, OS/2 and DOS. The product is available now for $2,495.

Brooktrout Technology, Inc., 144 Gould St., Needham, Mass. 02192; (617) 449-9009.

Wellfleet adds token-ring support to bridge/routers

Wellfleet Communications, Inc. last week added support for 4M and 16M bit/sec token-ring local-area networks to its line of internetworking bridge/routers.

The company also announced support for Source Routing Transparent, the proposed IEEE 802.1 standard that combines the functions of source routing and the Spanning Tree Protocol, two bridg-

(continued on page 32)

DataComm 552 DSU/CSU can support fractional T-1

Company also intros net management interface.

By Tom Smith
New Products Editor

MIDDLEBURY, Conn. — General DataComm, Inc. recently introduced a data service unit/channel service unit (DSU/CSU) that supports fractional T-1 speeds.

The DataComm 552 Fractional T1 DSU enables users to link data terminal equipment directly to a single wide-area digital line operating at 64K bit/sec or higher. The CSU portion of the product terminates a full T-1 line, with users paying only for the amount of bandwidth they use.

The new product complements the company's existing DataComm 551 Intelligent T1 CSU, a DSU/CSU that supports data transmission at full T-1 speed.

The DataComm 552's DSU supports data terminal equipment such as local-area network bridges, multiplexers and video-conferencing coder/decoders directly to a wide-area digital circuit. It has two local V.35 ports, or as an option, it can be configured with a single V.35 port and an EIA-530 port.

A maximum of three DataComm 552s can be daisy-chained at a single site to provide as many as six local data ports.

The DataComm 552's intelligent CSU supports D4 and extended superframe format framing techniques, and can support fractional T-1 services from all major carriers, according to General DataComm.

DataComm 552, which is expected to be available in October, can be purchased as a stand-alone unit for $3,695 or as a rack-mountable unit for $3,595.

General DataComm also took the wraps off an optional interface for the DataComm 552 and the DataComm 551 that can manage a maximum of 256 DSU/CSUs.

A single PMC-100 Performance Monitor Card can manage as many as 32 rack-mounted DSU/CSUs at a central site or up

(continued on page 32)

Fibermux adds token-ring support to Crossbow hub

CHATSWORTH, Calif. — Fibermux Corp. recently enhanced its Crossbow intelligent wiring hub to support token-ring local-area networks.

By adding token-ring support to its Crossbow Workstation Hub, Fibermux has enabled users to mix and match different types of LANs, media and protocols on a single hub, according to the company.

Fibermux said the hub, which supports Ethernet, will also make it easier to manage token-ring LANs, rather than relying on conventional management software to monitor and control token-ring multistation access units (MAU).

The Crossbow Hub can support as many as 10 token rings in addition to four Ethernets. The new token-ring interfaces connect MAUs or individual workstations to the hub.

Fibermux is offering five new token-ring interface modules:

- The CC6610T offers two ports for fiber connections and seven RJ-45 ports for unshielded twisted-pair wire. It carries a list price of $1,500.
- The CC6613T has 10 RJ-45 ports for unshielded twisted-pair wire. It is priced at $1,350.
- The CC6615T provides a single fiber link to six MAUs or net nodes via a fiber-to-shielded twisted-pair media converter. It costs $1,850.
- The CC6616T has six ports for IBM Type 1 shielded cabling. It costs $1,050.
- The CC6617T offers four ports for shielded twisted-pair connections and two ports that support fiber connections. It is priced at $1,250.

All of the interfaces are available now.

Each supports 4M or 16M bit/sec token-ring LANs.

Byron Henderson, vice-president of marketing at Fibermux, said the Crossbow Hub's centralized control and network management features will enable users to examine the status of each port on the net from a central location and isolate faults on a per-port basis, shutting down just one station.

By contrast, other network control packages for token rings can only manage MAUs by isolating a fault to a specific MAU and shutting down that entire unit, which can affect numerous end users.

Alantec's MLS upgrades

Product	Synchronous Serial Interface Module (SSIM)	MLS 425
Number of ports	1	4
Interfaces supported	RS-422, RS-449, V.35	Ethernet, T-1, SSIM
Description	Resides in MLS 10XX or MLS 425	Stand-alone unit designed for remote sites
Function	Link Ethernets to digital data service and fractional T-1 lines	Bridge up to four Ethernets on a local or remote basis
Price	$3,300	$3,800 base, $10,400 fully configured

GRAPHIC BY SUSAN J. CHAMPENY — SOURCE: ALANTEC, FREMONT, CALIF.

Alantec adds sub-T-1 card for E-net bridge

Multi LAN Switch, which previously supported only T-1, can now handle 56K and 64K speeds.

By Tom Smith
New Products Editor

FREMONT, Calif. — Alantec last week announced an interface that lets its Multi LAN Switch (MLS) Ethernet bridge support 56K and 64K bit/sec wide-area network transmission speeds.

The Synchronous Serial Line Interface Module (SSIM) is an optional interface for the MLS. It will make the MLS practical for users that can not cost-justify or fully utilize the bandwidth of a T-1 link, according to Mike Kalashian, executive vice-president at Alantec.

It will also be useful for users of low-speed dial-up and leased lines that need to support higher speed transmissions.

The single-port SSIM allows users to connect Ethernets over a carrier's digital data service (DDS) line, as well as over a T-1 line through a data service unit/channel service unit (DSU/CSU). The DSU/CSU is required to perform T-1 framing because the SSIM does not have that capability.

> The Synchronous Serial Line Interface Module is an optional interface for the MLS.
>
> ▲▲▲

The MLS previously supported one or more T-1 lines, but that T-1 interface performed T-1 framing so no CSU was required.

Last week's announcement also included a new model of the MLS that supports a maximum of four ports on two interface cards. Each card can support a mix of Ethernet, T-1 or DDS connections. The existing MLS system, MLS 10XX, supported five interface cards, or a total of 10 ports.

> The line supported by SSIM can operate at the U.S. and European T-1 rates.
>
> ▲▲▲

MLS is a dedicated IBM Personal Computer AT with a proprietary packet-switching bus capable of transmitting data at a rate of 160M bit/sec. It supports the Spanning Tree Protocol.

MLS can support Ethernet cards exclusively, in which case its sole function is local bridging. For users with remote bridging requirements, any number of slots can be populated with T-1 interfaces or SSIM cards.

The SSIM supports a single connection to the WAN, but users have the option of making that connection with an RS-422, RS-449 or V.35 interface, depending on the interface required by the hardware that is being used to terminate a T-1 or DDS line.

The line supported by SSIM can operate at 56K or 64K bit/sec, as well as the U.S. and European T-1 rates of 1.544M and 2.048M bit/sec, respectively, as long as there is a CSU to perform T-1 framing.

SSIM is available now for

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First Look

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ing protocols used for token-ring and Ethernet LANs, respectively.

With its new token-ring interface card, Wellfleet's Feeder Node, Link Node and Concentrator Node can route a variety of protocols between token-ring and Ethernet networks. Support for Source Routing Transparent means the devices can also bridge token-ring traffic.

The Feeder Node supports a single token-ring interface, the Link Node supports four, and the Concentrator Node supports a maximum of 13. A single interface can operate at 4M or 16M bit/sec.

The new token-ring interface is available now in three models. One model, which costs $5,500, has no wide-area interface and, therefore, must link to the wide-area network through another interface in the bridge/router. Another model has a single T-1 interface; it costs $7,000. The final model, which has two T-1 interfaces, costs $8,000.

Wellfleet Communications, Inc., 15 Crosby Drive, Bedford, Mass. 01730; (617) 275-2400.

Vitalink adds support for Xerox's XNS protocol to line of bridge/routers

Vitalink Communications Corp. recently introduced software for its TransPath family of bridge/routers that enables them to support various implementations of Xerox Corp.'s Xerox Network Systems protocol.

The new **TransPath 11.2** software release will allow users to deploy the device for routing Novell, Inc., 3Com Corp., Ungermann-Bass, Inc. and Xerox versions of XNS. Novell's implementation is commonly referred to as Internetwork Packet Exchange (IPX).

TransPath software previously only supported routing of Transmission Control Protocol/Internet Protocol data.

Vitalink's new software also offers enhanced TCP/IP security functions, including IP socket-level security, which enables users to restrict access according to TCP/IP protocols such as Telnet or File Transfer Protocol.

The new software is expected to be available in October for $2,500 for the TransPath VX350, which has a single Ethernet port and eight wide-area network ports. TransPath 11.2 for a new TransPath model, the **VX335,** which was included in the product introduction, costs $2,000.

The VX335, which can also serve as a bridge or a router, depending on configuration, has one Ethernet port and two WAN ports capable of supporting two T-1 lines.

The VX335 is available now for $13,500 when configured as a bridge/router and $12,750 when configured as an Ethernet bridge.

Finally, the company announced that customers using the TransPath 350, the TransLAN 350 Ethernet bridge and the TransRing 350 Token-Ring bridge can now configure their systems to support three T-1 lines, as opposed to two lines previously.

Users need to install a new interface card that supports three T-1 connections. That card is expected be available in October for $2,500.

Vitalink Communications Corp., 6607 Kaiser Drive, Fremont, Calif. 94555; (415) 794-1100.

DSU/CSU can support fractional T-1

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to 256 DSU/CSUs in remote sites, which must have a slave PMC-100 to communicate with the central-site master unit.

The PMC-100 enables the user to perform local and remote configuration and diagnostics. Configuration capabilities include changing line speeds or taking a DSU/CSU out of service. Diagnostics include loop-back and self-check tests.

The PMC-100 uses inband signaling to transmit management information over the wide-area network. An ASCII supervisory terminal can be attached to any one of the PMC-100s to perform management tasks.

Using dial-up modems linked to the PMC-100's modem port, diagnostic communications can be reestablished via modem even if a T-1 or fractional T-1 line fails.

PMC-100 is expected to be available in October for $1,895.

General DataComm can be reached by writing to 1579 Straits Tnpk., Middlebury, Conn. 06762, or by calling (203) 574-1118.

Alantec adds sub-T-1 card for E-net bridge

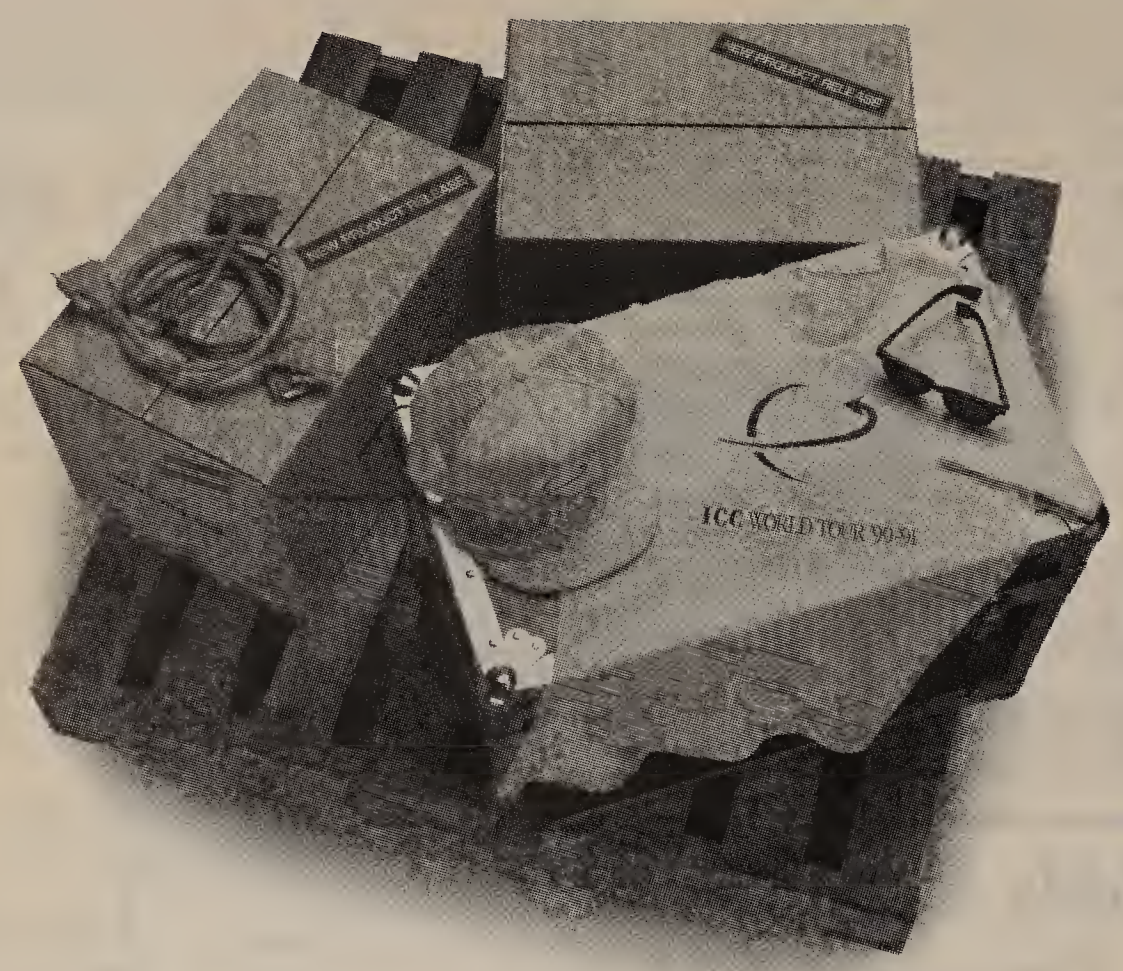
continued from page 31

$3,300, the same price as the T-1 and Ethernet interfaces.

In addition to providing sub-T-1 digital communications capabilities for the first time, Alantec also introduced the MLS 425, a two-slot version of the larger MLS that is designed for sites that have fewer local-area networks than the central site but still require a link to headquarters. MLS 425 can support four local Ethernets, or two local Ethernets and the user's choice of either DDS or T-1 wide-area connections.

MLS 425 is also available now for $3,800 in a base configuration including the chassis and software. Each interface costs $3,300, and a fully configured system costs $10,400.

Alantec can be reached by writing to 101 Hammond Ave., Fremont, Calif. 94539, or by calling (415) 770-1050.



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OPINIONS

NETWORK SECURITY

BY WILLIAM ROBINSON

Needed: A human approach to security

At a recent seminar for data center managers, the keynote speakers, a pair of high-powered Washington D.C. consultants, proposed a network security plan that uses a dual-key encryption algorithm, coupled with a system to detect altered messages. By means of a security server on the net, a message sender is authenticated to the receiver, preventing hackers from impersonating network users.

The security plan similarly provides a nonrepudiation method that gives the sender proof that the message has been received. Security includes steps to prevent unauthorized network monitoring. This extends beyond simply stopping the detection of who's talking to whom: The system seeks to prevent the spread of any information, including general traffic pattern variation over the day or year.

The overhead associated with such a complex system is enormous, particularly when compared to the percentage of traffic that actually benefits from the security. Encryption using dual keys requires that all users have easy access to a listing of the public keys of every valid user inside and outside the organization. This takes valuable time to maintain either a list, automated system or both. More than likely, a server or at least part of one would have to be devoted to the task.

Encryption itself adds overhead as well. Electronic mail tasks become computational exercises for the CPU as it passes memos through the Data Encryption Standard algorithm both at the sending and receiving ends.

More interestingly, many mail messages pass through multiple sending and receiving cycles. For example, a department head might send a report to a vice-president, who may comment on it and forward it to the president.

For proper verification, the department head sends an encrypted message to the vice-president. To keep the verification valid, the vice-president must re-encrypt the original encrypted report and forward a doubly encrypted message to the president. The president must use both his private key and the department head's public key to decode the report. Had a staff member written the report and submitted it electronically to his department head, the president would have had to apply two public keys in addition to his own private key.

It's not easy to totally automate this process since that would require the computer to have stored the president's private key electronically. That by itself would defeat the purpose of the encryption system. The president, therefore, must be trained to use the mail system and decrypt often complex messages. If a secretary does it for him, many of the security advantages of the encrypted mail system are lost. Yet how many chief executives would be willing to devote the time and effort to such procedures?

In addition, with one system dedicated entirely to network security services, what happens to corporate communications when that system goes down? If located remotely, are distant parts of the network able to function if their line to headquarters fails?

Most managers first attack the problem of network security with technological solutions, despite the ability of ingenious humans to batter and finesse their way past even the best of these. In reality, network security is best achieved by approaching the problem from the human perspective. Net security begins with proper hiring and with training programs to make security an automatic consideration on the job.

In tight budget times, we do not need multimillion-dollar security schemes to protect 1% of our net traffic. What we need are intelligent, commonsense approaches that balance technology, budgets and our very human failings.

Robinson is the director of the University of Nevada's System Computing Services, Southern Facility, in Las Vegas.

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EDITORIAL

Opportunity knocks again with User Excellence Awards

Who says opportunity only knocks once?

At *Network World,* opportunity knocks every year — in the form of our annual User Excellence Awards. The awards offer a chance to get the recognition you deserve within your company and in the network community for your innovative networking efforts.

This newspaper was founded on the belief that networking can change the way organizations work, thereby providing a real strategic advantage. Over the years, we've reported on hundreds of users who've proven just that.

Our User Excellence Awards honor the best of these innovative corporations, universities and government agencies. The awards are our way of spotlighting the cream of the crop in the network user community.

Past award winners include American Express Travel Related Services Co., Inc., Bechtel Group, Inc., CSX Corp., Dow Jones & Co., Inc., Florida Power & Light Co. and Sears Technology Services, Inc.

Taking part in the awards competition is easy. Simply submit a 250- to 500-word abstract describing how networking has helped your organization achieve its strategic objectives. Has networking helped differentiate your products and services from those of competitors or launch new products and services? Has it helped you bring products to market more quickly? Have network technologies helped you build closer, more productive relationships with customers or business partners? Has networking helped you provide better customer service or support?

SIXTH ANNUAL User Excellence Awards

In short, tell us how your network has given you a competitive edge. And remember, the size of your network isn't important; it's what you're doing with it that matters.

To enter, you may use the postage-paid entry form for the Sixth Annual User Excellence Awards that will appear in the Sept. 10 and Sept. 17 issues of *Network World.*

Abstracts can also be submitted via fax at (508) 820-3467 or mailed to: Special Projects Editor, *Network World,* 161 Worcester Road, Framingham, Mass. 01701. For more information about the awards, call (800) 622-1108.

All entries must include name, address and telephone number, and be received by Monday, Oct. 8.

What's that sound?

That's the sound of opportunity knocking again. Heed the call and get into the running for *Network World's* Sixth Annual User Excellence Awards.

OPINIONS

INTEROPERABILITY

BY JOHN MCQUILLAN

It's about time gateways get a little R-E-S-P-E-C-T

As users grapple with the problem of interoperability between many different communications architectures, one thing becomes clear: Gateways will be a critical part of any solution.

For years, users with multiple computing environments have needed gateways to link IBM and Digital Equipment Corp. systems or diverse electronic mail packages.

These gateways have performed valuable services, albeit with rather low performance and less than perfect functional mapping. Gateways are the Rodney Dangerfields of internetworking — they just don't get any respect. But times are changing.

Many users are now running even more diverse computer environments than in the past. The arrival of Open Systems Interconnection often means a network uses many protocol architectures rather than a single solution. One gateway between IBM and DEC computers used to be sufficient to convert between file formats and E-mail systems. Now many gateways are necessary.

In the file-transfer domain, some users need gateways to convert among the File Transfer Protocol, which is the Department of Defense standard; File Transfer, Access and Management (FTAM), which is the OSI standard, and Network File System, the Sun Microsystems, Inc. de facto standard.

In the E-mail world, gateways are used to convert between public net-, mainframe- and microcomputer-based E-mail systems.

In the engineering community, there is growing interest in using gateways to support the interexchange of computer-aided design information. And the desktop publishing community is finding them useful for image conversion between the various de facto standards for scanned images, computer graphics elements and video images.

McQuillan is president of McQuillan Consulting in Cambridge, Mass. He assists users and vendors in planning communications systems.

Changing role

The role of gateways is changing. Originally, the typical user's traffic generally stayed within a single community of interest. Traffic rarely needed to flow through a gateway to a different community or computer platform.

The one obvious exception was E-mail, which clearly is an application that transcends communities of interest.

> Interoperability across environments has become the norm rather than the exception.
>
> ▲▲▲

Today, communities within companies are fluid — people move from project to project, organizations change, and acquisitions, mergers and divestitures change the corporate landscape.

Furthermore, even within small work groups, different end users require different computer tools. Some users choose Macintoshes, some choose personal computers, and some require workstations.

On large computer systems, there are many users of dumb terminals who require information interchange with personal computer and workstation users.

Interoperability across these different environments has become the norm rather than the exception. Gateways are now being used for mission-critical applications and the exchange of data on a routine basis, not just for unimportant or secondary traffic.

Seen from the outside, gateways appear to be an almost perfect solution to these difficult problems. They offer interoperability without standardization and compatibility without consistency.

With gateways, companies can protect their prior investment and still solve the problem of electronic interchange. Gateways give departments freedom of choice while providing the corporation as a whole with a unifying technology.

Unfortunately, these benefits have come at a cost. Gateways have always been difficult to design and build. With a few exceptions, they have been not only expensive but also error-prone in operation, providing less than 100% fidelity in conversion. But as the need for gateways continues to grow and the market matures, we can expect gateway technology to improve in response.

This puts the use of gateway computers in a new light. Users are looking for higher performance and greater reliability as well as that ever-elusive goal — perfect fidelity of translation.

Unfortunately, gateways that convert between different address formats, message contents or internal code representations can seldom offer completely faithful translations.

After all, it is not possible to translate French into English with all of the subtle meanings intact. Nor is it likely that the reverse translation would yield the original French statement.

It will take many years before we solve the technical problems of incompatibility and agree on single solutions for each form of computer-based collaboration.

In fact, many in the industry feel that even after we solve the technological problems, there will be other, human reasons why different people choose different solutions for computerizing their work.

Gateways will be growing up fast over the next few years as they take their full place as important elements in the internetworking world.

"AIRING ONE'S DIRTY LINEN never makes for a great masterpiece," according to Francois Truffaut. But it makes for great opinion columns. Send us one.

Columns should be 600 words in length and submitted on disk, via modem or through MCI Mail at 390-4868.

If you'd like to write a column, call Alison Conliffe, assistant features editor, at (508) 820-7416 or fax your idea to us at (508) 820-3467.

TELETOONS

BY FRANK AND TROISE

LETTERS

License rights

Your recent article about a civil suit brought by an ex-employee against his former employer ("Suit over net control pack may hurt users," *NW,* July 30) may have created the unfortunate and untrue impression that the license rights of customers of Westinghouse Communications Software, Inc. have somehow been called into question by this litigation.

Enough is enough. The overblown account you seem to have adopted from the plaintiff's press kit sadly obscures the undisputed fact that Westinghouse stands 100% behind its products, its customers and its contractual obligations.

We will continue to do so — whether the pending lawsuit is dismissed during the initial proceedings this October or whether we actually have to go through an entire trial before this suit is resolved.

Harlan Rosenzweig
President
Westinghouse Communications Software, Inc.
Pittsburgh

Ameritech's view

Your recent article, "Suit over net control pack may hurt users" (*NW,* July 30), states that "Users of Ameritech's Ameritech Network Management System (ANM), announced last April, may also be affected. ANM relies on CMS-II billing functions as a third of its packaged network management offering."

The CMS-II offering is only one of several network management tool kits that we use as foundations for the solutions we build. ANM solutions do not rely on CMS-II billing functions to build all solutions. We use CMS-II only when it is the appropriate solution for the customer.

We would like to clarify unequivocally that the CMS-II billing feature would not af

(continued on page 47)

Network World *welcomes letters from its readers.*

Letters should be typed, double-spaced and sent to Editor, Network World, *161 Worcester Road, Box 9172, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

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Trends and TECHNOLOGIES RESHAPING networks: www

Evolving standards

OSI standards evolve into products

CONTINUED FROM PAGE 1
now support both X.400 and, increasingly, File Transfer, Access and Management (FTAM).

The protocols also differ at the lower layers, which determine whether the system running the OSI applications and protocol stack can communicate with other OSI systems via local-area networks, X.25 wide-area network links or both. The lower layers also determine the degree of efficiency and data integrity provided over those connections.

In contrast, the OSI application-layer protocols are designed as generic utilities that provide specific OSI network-compatible services to end users and end-user programs. They are not intended as self-contained applications.

For example, the CCITT X.400 recommendation is not an electronic mail application; it's an OSI application-layer protocol that provides a generic message exchange service within a store-and-forward networking environment.

Similarly, FTAM provides a generic file access and transfer service, enabling two OSI-based systems to exchange several types of files in real time over an OSI network.

An X.400 implementation consists of one or more user agents (UA) and a Message Transfer Agent (MTA). The UAs are the client portions of the protocol, which provide the end-user interface. The MTA is the server portion of the protocol, which provides mailbox storage, as well as switching and relaying functions. An MTA communicates with UAs or other MTAs via any of a number of X.400 protocol types (these are referred to as P1, P2, P3 and P7).

Most of the X.400 products shown in the tables beginning on page 38 support the 1984 version of the X.400 recommendation and typically either the P1 or P2 X.400 protocol types or both. The 1984 version, however, didn't provide a workable mechanism for remote UA access to an MTA ("X.400 standards only need crowning touch," *NW,* June 12, 1989).

As a result, users accessing the X.400-based public network services offered by US Sprint Communications Co. and Western Union Corp., for example, could communicate directly over remote links only on an MTA-to-MTA basis.

As noted in the product tables, implementation of P7 — a key protocol type from the 1988 X.400 recommendation — is being pursued with vigor so that a user at a personal computer, for example, can directly access a remote MTA, without first having to go through a local X.400 MTA. Unfortunately, a host of different protocol submodules exists in every one of the OSI protocols at every layer.

FTAM, for instance, spells out three different file and document types (structured and unstructured text, and unstructured binary files), as well as a host of different data types. The OSI transport protocol spells out five different classes of transport.

Protocol subset worries

Users want off-the-shelf OSI products they can load and run in a variety of systems. They also want offerings that enable different systems to interoperate over a common OSI backbone.

Regrettably, the present state of OSI, as represented by the OSI products available today, hasn't reached that degree of sophistication or user convenience. Until it does, users will need to get more involved in subprotocol details.

There is some movement toward defining specific combinations of protocols from the enormous menu of OSI subprotocol possibilities in what are called "implementation profiles." And rather than learn all about every subprotocol class or type that has evolved from the OSI model over the past 12 years, users may find it easier to focus on the narrow set of protocol modules specified in one or more of these profiles.

Certain OSI protocols, subpro-

(continued on page 41)

Mier, a Network World *contributing editor, is president and founder of Mier Communications, Inc., a Princeton Junction, N.J.-based consultancy that specializes in computer communications and networking.*

Network World looks at the first big wave of OSI-based networking products to hit the beach.

Direct native-mode OSI networking products

Company	Product	Description/operating environment	OSI upper layer protocol support and interfaces	OSI transport/network environments supported	Interoperability	Price
Allen-Bradley Co. Ann Arbor, Mich. (313) 998-2000	PLC-3 MAP Interface	MAP 3.0 implementation on an adapter card for vendor's PLC-3 (proprietary bus)	MMS, per MAP 3.0	Token Bus/802.4, either 5M bit/sec carrierband or 10M bit/sec broadband; supports Transport Class 4; vendor offers a MAC-layer bridge to Ethernet/802.3	Concord, DEC, HP, IBM, Motorola (MAP adapters/interfaces)	MAP adapter and software (Layers 1 to 7) costs $4,990 for carrierband, $6,390 for broadband (adapters/modems included)
AT&T Computer Systems Morristown, N.J. (800) 247-1212	OSI Communications Platform Release 1 (CP-1)	Source-code OSI software (written in C) enables users to execute, or design and develop, applications for Unix-OSI networking; portable to any Unix System V environment	FTAM, CMISE library; accepts standard Unix system calls and kernel-based function calls	Operates over LANs (using ISO 8473 Internet connectionless network service) or WAN; supports Transport Classes 0, 2 and 4, and ES-IS routing exchange protocol (ISO 9542)	Retix; others via COS I-Lab and NIST OSINET (FTAM)	Undetermined at press time; announcement scheduled for Aug. 31, availability Sept. 1
Bull HN Information Systems, Inc. Billerica, Mass. (508) 294-6000	OSI/DSA 6 (2 software products)	X.400 and FTAM protocol support for Bull DPS 6000 computers running Bull's GCOS 6/HVS operating system	X.400 (1984), FTAM	Ethernet/802.3 (using ISO 8473 Internet Protocol of Basic OSI Communications package); X.25 (1984) WAN	AT&T, CDC, DG, DEC, HP, IBM, Sun, US Sprint, Unisys, Wang, Xerox (X.400 systems); DEC, Sun, DG, Unisys (FTAM)	X.400/MHS (Layers 6 and 7), $2,955 to $4,500 initial license fee; OSI Basic Communications (Layers 3 to 5), $1,147 to $1,765; X.25 (Layers 1 to 3), $1,398 to $2,150; FTAM (Layers 6 and 7), $3,563 to $5,481
Concord Communications, Inc. Marlboro, Mass. (508) 460-4646	MAPware Series 1200 and 1400	MAP 3.0-based, 7-layer OSI support for 286- or 386-based PCs or PS/2s running DOS 3.1 or later or OS/2; Series 1200 is for PC/AT bus, Series 1400 for PS/2 Micro Channel bus	MMS; offers C language access to ACSE, DUA and direct to LLC (Layer 2)	Token Bus 802.4 LAN; either broadband or carrierband	Computrol, DEC, IBM (MAP interfaces, adapters)	Adapter and software for PC/AT-bus systems costs from $1,395 to $2,295; PS/2-Micro Channel Architecture bus versions cost from $1,895 to $2,295
Concurrent Computer Corp. Tinton Falls, N.J. (201) 758-7000	RTnet-OSI/32, RTnet-FTAM/32, RTnet-X400/32 (3 products)	Layers 3 to 7 FTAM and X.400 support for Concurrent's Series 3200 computers running OS/32 operating system; similar support for Concurrent's RTU (Unix System V) operating system expected by year end	X.400 (1984), FTAM; software includes value-added user utilities optimized for communications with other Concurrent systems (including remote job entry, virtual terminal, transaction processing)	Ethernet/802.3 (using ISO 8473 Internet connectionless network service); X.25 WANs; supports Transport Classes 0, 4; supports Class 4 over X.25 (usually Class 0) with SNDCF	DEC, Sun (tested at Layers 1 to 6)	RTnet-OSI/32 (Layers 3 to 6) costs from $3,350 to $13,200, configuration dependent; RTnet-FTAM/32 or RTnet-X400/32 (separate Layer-7 products) range in price from $1,800 to $7,150 each
Control Data Corp. Minneapolis (612) 853-8100	CDCNET:FTAM/VE and X.400/MHS Interface	Layers 3 to 7 FTAM and X.400 support for CDC Cyber series computers running NOS or NOS/VE operating systems	X.400 (1984), FTAM and ACSE	Ethernet/802.3 (using ISO 8473 Internet connectionless network service); X.25 WAN; supports Transport Classes 0 and 4	AT&T, Bull, DG, DEC, HP, Sun, Unisys, others (X.400 and/or FTAM systems)	FTAM/VE (Layers 3 to 7) costs from $1,875 to $7,500, depending on Cyber configuration; X.400 MHS Interface costs $5,618
	OSI FTAM and OSI X.400 for 4000 Series (as many as 4 software products)	Full X.400 and FTAM support for CDC 4000 series computers running EP/IX 1.3.1 or later (CDC's version of Unix System V)	X.400 (1984), FTAM and ASCE; includes an X.500 DUA access	Ethernet/802.3 (using ISO 8473 Internet connectionless network service); X.25 WAN; supports Transport Classes 0 and 4	11 vendors scheduled for interoperability testing in September, including AT&T, DEC, IBM, Sun (X.400 and/or FTAM systems)	FTAM (Layer 7) costs from $1,000 to $5,000, depending on configuration; X.400 (Layer 7) from $1,500 to $7,500; Layer 1 to 6 support (including X.500 agent/access) costs $1,000 to $5,000
Data Connection, Ltd. Vienna, Va. (703) 790-0111	POP-X400 (as many as 5 discrete software modules)	Provides 1988-version X.400 support and full OSI stack for Unix System V.3 and V.4; features remote user agent capability using 1988 P3 protocol over remote operations	X.400 (1984 P2, with 1988 MTA, P1, P3); application and gateway APIs per X.400 API Association; X.500 interface/ISO 7493-3 addressing; Unix TLI interface to transport, implemented as a Streams module	Ethernet/802.3 (using ISO 8473 Internet connectionless network service); X.25 WAN; supports Transport Classes 0, 2 and 4, and ES-IS protocol/routing; may require some customized integration for different LAN/WAN drivers	Earlier version (1984) was used as COS reference implementation; vendor says few other 1988-X.400 products to test with	Depends on system size and number of copies of software licensed; minimum license fee is $200,000
	POP-TP (as many as five discrete software modules)	Implementation of the OSI Transaction Protocol (an ISO Draft Proposal) for PCs running DOS 3.3 or later; software for Layers 4 to 7	Package includes software for mapping IBM's APPC protocol to OSI-TP, providing transparency to programmers of underlying OSI or SNA network	Supported currently over X.25 WAN; requires an Eicon Technology Corp. X.25 card (for Layers 1 to 3) or may be integrated with other PC synchronous adapter cards	Vendor declines to specify	POP-TP (provides Layers 4 to 7) costs $500 per copy, minimum 500 copies; includes APPC/LU 6.2 programmer's interface to OSI-TP
Data General Corp. Westboro, Mass. (508) 366-8911	DG/OSI Transport Services (DG/OTS) and DG/OSI Application Platform Interface (DG/OAPI)	DG/OTS provides Layer 2 to 6 support (plus Layer 7 ACSE) for DG Eclipse/MV systems running AOS/VS II operating system; DG/OAPI provides a set of program interfaces for application developers to access DG/OTS	API product enables program access to transport or presentation layer of DG/OTS (Layers 4 or 6, respectively); DG/OAPI is not required when FTAM or X.400 is the application run at Layer 7 over DG/OTS	Operates over LANs using ISO 8473 Internet connectionless protocol and LLC-1, and over X.25 (1984) WANs; Transport Class 4 only, with IP, is operated over both LANs and X.25	Tested as part of full stack when X.400 of FTAM is run on top; see below for X.400 and FTAM interoperability	DG/OTS (Layers 2 to 6) costs from $900 to $10,440, depending on system configuration; API package (DG/OAPI), which includes ASN.1 compiler for software developers, costs from $2,500 to $29,000
	DG/FTAM	FTAM (Layer 7) support for DG Eclipse/MV systems running AOS/II operating system; runs over and requires DG/OTS for Layer 2 to 6 support (see above)	FTAM (per ISO 8571); program access is via the GM-MAP 3.1 specification, which details a standard interface to FTAM	As provided by DG/OTS (see above); uses Transport Class 4 and IP over both LANs and X.25	Bull, DEC, HP, Retix, Touch, Unisys (FTAM systems)	DG/FTAM (Layer 7, plus ASN.1) software costs from $1,500 to $17,400, dependent on configuration; requires DG/OTS for lower layer OSI support (see above)
	DG/X.400	Provides X.400 (Layer 7) support for DG Eclipse/MV systems running AOS/VS or AOS/VS II operating system; requires DG/OTS for Layer 2 to 6 support (see above)	X.400 (1984), including P1, P2 protocols; provides access/conversion for messages and files generated by DG's Comprehensive Electronic Office to and from X.400	As provided by DG/OTS, except that Transport Class 0 is used for X.400 over X.25	AT&T, Bull, DEC, HP, IBM, ICL, NCR, OSIware, Philips, Prime, Retix, Siemens, Unisys, Wang, Xerox, others (X.400 systems)	DG/X.400 (Layer 7, plus ASN.1) software costs from $1,445 to $16,750, depending on configuration; requires DG/OTS for lower layer OSI support (see above)
Digital Equipment Corp. Maynard, Mass. (508) 493-7161	VAX OSI Applications Kernel (OSAK)	Provides OSI Layer 3 to 5 support on any VAX/VMS platform; designed for application developers	No application (Layer 7) support provided; OSAK's session-layer interface is open to users for application development (includes session-layer API)	Ethernet/802.3 (uses ISO 8473 Internet connectionless network service of OSAK); X.25 (1984) WAN (via VAX P.S.I. software)	See below for X.400, FTAM	OSAK (Layers 3 to 5) ranges from $1,873 (software license for low-end VAX Server 3100) to $54,000 (high-end VAX 9000) (1)
	VAX Message Router X.400 Gateway (MRX) (2 products)	Provides X.400 (Layers 6 and 7) support on VAX/VMS platforms; includes Layer 4 to 5 support from OSAK (separate purchase of OSAK not required)	X.400 (1984); accessed by VMS DCL commands, as well as by DEC/EDI application, which runs on top of X.400 stack, or by any DEC Mailbus (E-mail gateway) application	See above, as supported by OSAK	Bull, CDC, DG, Fujitsu, HP, IBM, ICL, Motorola, NCR, Nixdorf, Olivetti, Philips, Prime, Rank Xerox, Retix, Siemens, Sun, Tandem, Unisys, Wang, others (X.400 systems); over a dozen U.S. and foreign PTT E-Mail carriers/services	MRX (Layers 6 and 7) software license, which includes appropriate OSAK Layers 3 to 5, costs from $1,060 to $30,816 (low-end VAXserver 3100 to VAX 9000 system) (1)
	VAX FTAM	Provides FTAM support (Layer 7) over Layers 3 to 6 (included) on VAX/VMS platform (VMS 6.0 or later)	FTAM; accessed via VAX/VMS DCL commands, as with x.400 above	See above, as supported by OSAK	Bull, Fujitsu, IBM, ICL, HP, Mitsubishi, NCR, Retix, Sun, Touch, Unisys, Wang, Wollongong (FTAM systems)	VAX FTAM (Layers 6 and 7) software license, which includes appropriate OSAK Layers 3 to 5, costs from $900 to $26,160 (low- to high-end VAX configuration) (1)
	DEC/EDI (3 software products)	VAX Application that runs over an X.400 stack (MRX and OSAK); provides support for several document format standards	International EDIFACT standard, ANSI X.12 document format standard	See above, as supported by OSAK; alternately, can be configured to operate over IBM SNA protocols/network	Numerous EDI application software suppliers (can communicate with other vendors' X.400 systems shown above)	Consists of DEC/EDI Applications Server, Translation Server and Communications Server (all priced separately); combined price starts at $10,000 for low-end VAX
	DEComni/VMS	Provides MAP 3.0 support on VAX/VMS platforms	Manufacturing Message Specification (MMS); user interface to FTAM, Association Control Service Elements (ACSE) and Directory User Agent provided	Ethernet/802.3; Token Bus/802.4 (using a Concord Communications, Inc. Unibus or VAX BI adapter)	Allen Bradley, GE Fanuc, others (MAP interfaces/ adapters); also, compliant with specs of NIST's MMS Special Interest Group	Software license (Layers 3 to 7) starts at $530 for low-end VAX configuration

Direct native-mode OSI networking products (cont'd on page 40)

Company	Product	Description/operating environment	OSI upper layer protocol support and interfaces	OSI transport/network environments supported	Interoperability	Price
Hewlett-Packard Co. Cupertino, Calif. (800) 752-0900	HP X.400/9000 (requires OTS/9000 and other software for OSI lower layers)	Provides X.400 (Layer 6 and 7) support for HP 9000 systems running HP-UX (HP's Unix System V); provides native-mode OSI for HP Open Mail users, or lets HP 9000 act like a relaying MTA, or a Unix E-mail-to-X.400 gateway	Currently, X.400 is directly accessed by HP OpenMail users and applications; supports binary file types, per NIST Implementor's agreement; handles up to 200 adjacent MTAs as a relaying MTA	X.400 software runs over, and requires, OTS/9000 (HP's OSI Layers 4 and 5 module), which supports Ethernet/802.3 or X.25; supports Transport Classes 0, 2 and 4	Bull, CDC, DEC, DG, IBM, Nixdorf, NCR, Olivetti, Prime, Retix, Siemens, Sun, Unisys, Wang, Xerox (X.400 systems); 11 U.S. and foreign PTT E-mail carriers/service providers	HP X.400/9000 (Layers 6 and 7) costs from $6,500 to $23,500, depending on HP 9000 configuration; requires OTS/9000 software; other software (HP X.25, etc.) also required
	HP MAP 3.0 MMS/800 for HP 9000	Provides MAP 3.0-based, 7-Layer OSI support for HP 9000 Series 800 computers running HP-UX 7.0 or later; Layer 7 (MMS) software runs over HP OSI Express MAP 3.0 Link hardware	MMS, including a standard C-language programmatic interface (per MAP/TOP User Group AI Subgroup); includes access to X.500 directory service	Token Bus/802.4 LAN; either broadband or carrierband	Allen-Bradley, Concord, GE-Fanuc, IBM, Motorola (MAP adapters/interfaces)	MAP 3.0 MMS (Layer 7) costs from $3,000 (low-end Series 815) to $31,700 (Series 870); requires HP OSI Express MAP 3.0 Link (for Layers 1 to 6, includes connection to either broadband or carrierband MAP 3.0 network)
IBM Armonk, N.Y. (914) 765-1900	OSI/Communications Subsystem (OSI/CS)	Provides OSI Layer 3 to 6 (plus Layer-7 ASCE) support on IBM S/370 host computers running MVS and VM operating systems; for FTAM running on top, or direct access by application developers to Layers 5 or 6	FTAM (OSI/File Services) can run on top as application layer; also, programming interfaces are offered so C and COBOL applications can directly access ACSE, session and presentation (Layers 5 and 6)	Currently, supports X.25 WAN connectivity via X.25 NPSI on 3745 front end (or ICA adapter of 9370 running VM); supports Transport Classes 0, 2, and 4	Testing under way with IBM's FTAM (OSI/File Services) over OSI/CS	OSI/CS (Layers 3 to 6) costs from $9,985 to $144,000 (one-time charge, depending on system configuration and operating system), or else from $332 to $2,880 per month for software license charge
	OSI/File Services	Provides Layer-7 FTAM support on S/370 hosts running MVS or VM; runs over, and requires, OSI/Communications Subsystem	FTAM; provides end-user interface and programming interfaces in C and COBOL	As supported by OSI/CS, see above	Delivered in June 1990 (for MVS) and September 1990 (for VM); testing via OSINET now under way	OSI/File Services (Layer 7) costs from $6,390 to $73,420 (one-time charge, depending on system configuration and operating system), or else from $213 to $1,415 per month for software license charge
	Open Systems Message Exchange (OSME)	Provides X.400 Layer 3 to 7 support on S/370 systems running MVS or VM; supports MTA function and P1 protocols	X.400 (1984); designed to run with software modules linking to DISOSS or PROFS systems (see their descriptions in 'OSI Gateway' table)	As with OS/CS (above), X.25 connectivity is provided through X.25 NPSI on 3745 or 3720 front-end processors	AT&T, DEC, DG, HP, Wang (X.400 systems); SprintMail (TeleMail) and MCIMail (X.400 carrier services)	OSME (Layers 3 to 7) costs from $45,150 (VM) to $77,700 (MVS) on one-time charge basis, or from $2,055 to $3,240 monthly; links to DISOSS and PROFS are additional
	AIX OSI Messaging and Filing/6000	Provides X.400 and FTAM (Layer 3 to 7) support on IBM RISC 6000 systems running AIX (IBM's Unix) v3; X.25 and/or LAN support required for OSI Layers 1 to 3, as appropriate	FTAM, X.400 (1984); package includes gateways to TCP/IP (FTP and SMTP); supports unstructured and binary files (FTAM-1 and -3)	Token Ring/802.5, Ethernet/802.3 and X.25 WAN connectivity supported	Testing now under way; no interoperability specifics yet available	AIX OSI Messaging and Filing/6000 (Layers 3 to 7) costs from $2,500 to $12,000, depending on system configuration; LAN and/or X.25 adapters/links are additional
NCR Corp. Dayton, Ohio (513) 445-5000	NCR Tower OSI Networking (consists of up to 5 discrete software modules)	Provides X.400 and FTAM (Layer 3 to 7) support on the NCR Tower computer (Models 200 to 850) running Unix V.3 operating system	FTAM, X.400 (1984); includes support for central X.500 Directory; software offers 6 user APIs for access to various layers in the OSI stack (MAP/TOP 3.0 API to FTAM, Unix Command Line, Streams, etc.)	Current release (4.0) supports operation over Ethernet/802.3 LANs and X.25 WANs; supports Transport Classes 0, 2 and 4 (and negotiation); Class 4 can be run over LANs and X.25 subnetworks	Bull, DEC, ICL, Nixdorf, Olivetti, Retix, Sun, Unisys (X.400 & FTAM systems); AT&T, HP, IBM, OSIware, Prime, Siemens, Tandem, Wang, Xerox (X.400 only); Cray, DG, Novell, 3Com (FTAM only)	NCR Tower OSI Networking (Layers 3 to 7) costs from $3,300 to about $29,400, depending on system configuration, features and modules required
OSIware Burnaby, British Columbia (604) 436-2922	Messenger 400	A C-language implementation of X.400 that provides Layer 4 to 7 support on a wide range of systems, including: IBM S/370 (MVS & VM); OS/2, DOS; PC-LAN servers; DEC VAX; AT&T 3B2; Sun; Tandem (Guardian); Unisys 6000	X.400 (1984), includes 4 APIs, allowing user/programmer access: to MTA level for gateway applications; to Transport Layer; to user agent level; and a user-command API, to modify user interface	Transport layer (included) supports Transport Classes 0, 2 and 4; support at network layer and below depends on particular platform; can be operated over LANs or WAN links	DEC, DG, IBM, ICL, Nixdorf, Retix, Sun, others (X.400 systems)	Varies with platform, object-code versions (Layers 4 to 7) range in price from $25,000 to $100,000 for IBM S/370, $500 for DOS, $5,000 for OS/2, and $2,000 to $6,000 per PC-LAN server (single MTA, unlimited user agents)
	Directory 500	Centralized directory; an implementation of current X.500-series specifications, runs as either an independent application or integrated with X.400, under Unix System V or Sun OS	X.500 Directory; supports all X.521 object classes and all X.520 attribute types; includes DUA, DSA and an API for customizing DUA (user-agent) interface	Package includes layers down through the Transport layer, which can be integrated over X.25 WAN links or other network environments	ICL, Nixdorf, Retix, others (X.500 user access); product has been adopted by numerous OEMs	Source-code version (written in C) costs $150,000; object-code versions also available (pricing ranges are generally equivalent to the Messenger 400 product; see above)
Prime Computer, Inc. Natick, Mass. (508) 655-8000	X.400 MTA, X.400 Programmers Kit, and OSI-Mail (3 products)	Provides full X.400 (Layer 3 to 7) support for Prime 50-Series computers running PRIMOS operating system	X.400 (1984); OSI-Mail, an E-Mail application with an X.400 MTA, provides end-user interface to X.400; Programmers Kit offers access to different OSI protocol layers	Supports LAN and WAN connections	AT&T, Bull, CDC, DEC, DG, Datapoint, Dialcom, Hitachi, HP, IBM, ICL, Motorola, NCR, NEC, Nixdorf, OKI, Olivetti, OSIware, Rank Xerox, Retix, Sun, Tandem, Unisys, Wang (X.400 systems)	X.400 base software, including an MTA component, costs from $2,500 to $10,000, depending on system configuration; OSI-Mail costs from $1,500 to $12,000; X.400 Programmers Kit costs $16,500
Retix Santa Monica, Calif. (213) 399-2200	X.400 for Unix (up to 7 discrete software products)	Modular software which collectively provides X.400 Layer 2 to 7 support on SCO Unix or Interactive 386/ix Unix systems (typically 386 LAN servers); supports range of X.400 user agent platforms (DOS, Mac, Unix, etc.)	X.400 (1984); separate X.400 Gateway API library software enables links to user programs, gateways; includes interface conformant to X.400 API Association standard	Two different packages offered for Layer 2 to 4 support: version for X.25 WANs supports Transport Classes 0, 2 and 4; version for LANs does Transport Class 4, CLNP, ES-IS protocol and LLC-1	Bull, CDC, DEC, DG, HP, ICL, NCR, Olivetti, Prime, Philips, Siemens, Sun, Tandem, Unisys, Wang, others (X.400 systems)	X.400 (Layers 5 to 7) costs from $1,000 to $6,000; Layer 2 to 4 modules cost $300 for LAN, $450 for X.25 WAN; X.400 Gateway API library costs $15,000; separate modules offered for Unix, DOS, Mac user agents
	FTAM for Unix (up to 5 discrete software products)	Modular software which collectively provides FTAM Layer 2 to 7 support on SCO Unix or Interactive 386/ix Unix systems (typically 386-based LAN servers); supports DOS and/or Unix systems as FTAM clients	FTAM; includes Directory Access Protocol, support for FTAM Phase 2	Four different packages available for Layer 2 to 4 support: LAN or X.25-WAN versions for DOS, and LAN or X.25-WAN versions for Unix; LAN version for DOS or Unix specifies a Western Digital Ethernet LAN adapter	Bull, DEC, HP, IBM, ICL, NCR, Novell, Olivetti, Sun, Unisys (FTAM systems)	FTAM for Unix (Layers 5 to 7) costs from $400 to $600, includes Unix client and server software; FTAM for DOS (client only) costs $200 to 300; Transport software (Layers 2 to 4) costs from $300 (LAN) to $450 (WAN)
	Virtual Terminal (VT) for Unix (up to 5 discrete software products)	Modular software which collectively provides VTP Layer 2 to 7 support on SCO Unix or Interactive 386/ix Unix systems (typically 386 LAN servers); supports DOS and/or Unix systems as VT clients	VTP	Same as for Retix's FTAM, see above	None specified by vendor	VT for Unix (Layers 5 to 7) costs from $400 to $600, includes Unix client and server software; VT for DOS (client only) costs $200 to 300; Transport software (Layers 2 to 4) costs from $300 (LAN) to $450 (WAN)

ACSE = Association Control Service Elements
API = Application Program Interface
CLNP = Connectionless Network Protocol
CMISE = Common Management Information Service Element
CONS = Connection-Oriented Network Service
COS = Corporation for Open Systems International
DCL = Digital Control Language
DSA = Directory Service Agent
DUA = Directory User Agent
ES-IS = End System-to-Intermediate System
FTAM = File Transfer, Access and Management
FTP = File Transfer Protocol
GOSIP = Government OSI Profile
ISO = International Standards Organization
LLC = Logical Link Control
MAC = Media Access Control
MHS = Message Handling System
MMS = Manufacturing Message Specification
MTA = Message Transfer Agent
NIST = National Institute of Standards and Technology
NPSI = Network Control Program Packet-Switching Interface
OSAK = OSI Applications Kernel
PLC = Programmable logic controller
ROSE = Remote Operations Service Element
SCO = Santa Cruz Operation
SMTP = Simple Mail Transfer Protocol
SNDCF = Subnetwork Dependent Convergence Function
TLI = Transport Layer Interface
VTP = Virtual Terminal Protocol

FOOTNOTE:
(1) DEC also offers a combination VAX OSI Applications Package, which includes FTAM, MRX and OSAK, and costs from $9,371 (VAX 750/780 range) to $29,611 (VAX 9000 system); not available for MicroVAX or below.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

Direct native-mode OSI networking products (cont'd from page 39)

Company	Product	Description/operating environment	OSI upper layer protocol support and interfaces	OSI transport/network environments supported	Interoperability	Price
Retix	Openserver 400, X.400 for DOS (up to 10 discrete software products)	Modular software which collectively provides X.400 Layer 2 to 7 support on DOS systems (typically as LAN servers); single- or multiple-MTA versions; user agent software available for DOS or Mac (separate modules)	X.400 (1984); a separate Openserver 400 Developer's Kit contains API libraries for programmatic access	Separate transport modules (Layers 2 to 4) offered for operation over LAN or X.25 WAN; an X.25 WAN coprocessor board is available; LAN Transport requires Western Digital WD8003E Ethernet LAN adapter	Bull, CDC, DEC, DG, HP, ICL, NCR, Olivetti, Prime, Philips, Siemens, Sun, Tandem, Unisys, Wang, others (X.400 systems)	X.400 for DOS (Layers 5 to 7) costs from $3,000 to $5,500 (single or multiple MTAs); Transport modules (Layers 2 to 4) cost $300 to $400; user agents for Mac, DOS cost $35 to $90; Developer's Kit costs $15,000
Stratus Computer, Inc. Marlboro, Mass. (508) 460-2000	Carrier400 (X.400 software from ICL running on Stratus platform)	Full 1988-X.400 implementation, integrated along with an X.500 Directory (Layers 6 and 7), which run over a Stratus lower layer OSI protocol stack on a Stratus XA2000 system running the VOS operating system	X.400 (1988, along with 1984-X.400 compatibility mode), X.500; features include support of the 1988 P7 protocol that implements remote user agent	Configuration is designed for operation over X.25 WAN links; supports Transport classes 0, 2 and 4; requires a synchronous line adapter card and Stratus X.25 networking software (Layers 1 to 3)	DEC, DG, NCR, OSIware, Prime, Retix, others (with existing and previous ICL OSI/X.400 systems and versions)	Carrier400 software (X.400 and X.500 Layers 6 and 7 applications, supplied by ICL Network Systems) starts at $300,000; Stratus OSI software (Layers 4 and 5) from $1,700 to $4,800
Sun Microsystems, Inc. Mountain View, Calif. (415) 960-1300	SunNet OSI 6.0, SunNet MHS 6.0 (2 products)	SunNet OSI provides a full FTAM-based OSI stack (Layers 2 to 7); SunNet MHS (Layers 6 and 7) software runs over SunNet OSI's Layers 2 to 5; for Sun-3, -4 and SPARCsystem computers running SunOS 4.0	FTAM (NIST Phase 1), plus X.400 (1984) when both products run concurrently; compliant with MAP 2.1 and TOP 1.0; user command-line interface to FTAM; program access to session, transport	Ethernet/802.3 and ANSI FDDI LANs; X.25 (1980) WANs; Transport Classes 0 and 4 supported; Transport Class 4, CLNP and LLC-1 are run over FDDI or Ethernet	AT&T, DEC, DG, HP, IBM, Nixdorf, Retix, Siemens, Tandem, Unisys, Wang, Xerox (X.400 and/or FTAM systems); 5 U.S. and foreign X.400-based E-mail carriers/services	SunNet OSI (Layers 2 to 7, with FTAM) costs $2,500; SunNet MHS (Layers 6 and 7) costs $6,000; SunNet X.25 (Layers 1 to 3) and LAN adapters are additional
Tandem Computers, Inc. Cupertino, Calif. (408) 285-6000	OSI Application Services (OSI/AS), and OSI Transport Services (OSI/TS); 2 products	Two products collectively provide a generic OSI (Layers 3 to 7) platform on Tandem systems running Guardian operating system; limited application Layer 7; user needs to add own Layer-7 application(s)	Only ACSE provided at Layer 7; user needs to add or write own Layer-7 applications; program access and APIs to ACSE and to transport layer (to OSI/TS software)	Any 802.2 (LLC)-based LANs; X.25 WANs; supports all Transport Classes (0 to 4), plus SNDCF, for bridging CLNP to X.25 subnetworks	Bull, DEC, IBM, Fujitsu, Pyramid (limited testing, as Tandem's OSI provides only partial application layer)	OSI/AS (Layers 5 to 7) costs from $2,475 to $7,425, depending on system configuration; OSI/TS (Layers 3 and 4) costs from $415 to $1,125; X.25 (Layers 1 to 3) costs $550 to $805
TITN, Inc. Pleasanton, Calif. (415) 484-5674	Application-layer OSI modules (4 software products)	Set of application (Layer 7) OSI protocol modules; source-code software, written in C; can be ported to most systems with C compiler; designed to run over lower layer OSI protocol modules from vendor	X.400 (1988, but with 1984-mode support), FTAM, VTP, CMISE, features P7 protocol support in 1988 X.400	See below for vendor's OSI lower layer offerings; as with Layer-7 applications, these are source code, written in C, and licensed as separate modules	Datapoint, DEC, DG, HP, IBM, ICL, Stratus, Tandem, Unisys (X.400 systems); Bull, DEC, HP, IBM, Olivetti, Retix, Unisys (FTAM systems); Intel (VTP)	X.400 (Layer 7) license starts at $36,000; FTAM (Layer 7) license starts at $15,000; CMISE (Layer 7) license starts at $9,000; VTP (Layer 7) license starts at $18,000
	Session- and presentation-layer OSI modules (4 software products)	Set of Layers 5 and 6 (and Layer-7 ACSE) OSI protocol modules; source-code software, written in C; can be ported to most systems with C compiler; designed to run over vendor's lower layer OSI modules and below Layer 7 (see above)	Designed to be integrated with, and accessed by, the above Layer-7 applications; modules provide ACSE, ROSE, presentation- and session-layer protocol support	See below for vendor's OSI lower layer offerings; as with Layer 7 applications, these are source code, written in C, and licensed as separate modules	See above for testing of application-layer modules (over lower layer stacks from vendor)	Licenses start at $12,000 for presentation (Layer 6) module; $5,000 each for ROSE or ACSE (Layer 7) modules; and $12,000 for session (Layer 5) module
	Lower layer OSI protocol modules (6 software products)	Set of Layer 2 to 4 OSI protocol modules; these are source-code software products, written in C; can be ported to most systems with C compiler; designed to run under vendor's higher layer OSI modules (see above)	See above for Layer 5 to 7 protocol modules	LANs and X.25 WANs; X.25 source code complies with all CCITT versions through 1988; modules include Transport Protocol (all classes), ES-IS protocol, and LLC	See above; vendor says its X.25 code has been adopted by 90 computer vendors, compatible with over 19 U.S. and foreign packet nets	Licenses start at $12,000 for transport (Layer 4) module; $27,000 for X.25 (Layers 2 and 3); $10,800 for CLNP; $10,000 for ES-IS protocol; $5,000 for LLC (Layer 2)
Touch Communications, Inc. Campbell, Calif. (408) 374-2500	Worldtalk/400 (3 software products)	Full X.400 (1984) implementation (Layers 3 to 7) designed to enable DOS, Macintosh, or Unix System V-based platform to be configured as an X.400 gateway for proprietary E-mail systems	X.400 (1984); features an API to the X.400 MTA for gateway applications; customers can define own user agents; TLI	X.400 Core module provides Layers 3 to 5 support; designed for operation over Ethernet/802.3 LANs or X.25 WANs (using Eicon's X.25 adapter/software)	Bull, CDC, DEC, HP, IBM, Intel, MCI, Olivetti, Retix, SoftSwitch, Sun, Unisys, US Sprint, others (X.400 systems)	X.400 application (Layers 6 and 7) costs $3,000; X.400 Core module (Layers 3 to 5) costs $5,000; Gateway API costs $2,000; gateways to many E-mail systems available for $2,000 each
	Alliance OSI Stack	Customized OSI (Layers 3 to 7) protocol stack, licensed in C-language source code (for large users, OEMs, etc.); can be ported to most systems; integrated into a full stack based on specific protocol, operating environment requirements	Application (Layer 7) support available for X.400 (1984), FTAM, X.500 Directory; interfaces can be provided to any OSI layer, standard APIs supported	Core OSI components at Layers 3 and 4 include support for ES-IS routing, all Transport classes (0 to 4), CLNP or CONS over X.25	In addition to X.400 (listed above), FTAM interoperability with Apple, Bull, CDC, Concurrent Computer, DEC, HP, IBM, Intel, Motorola, Olivetti, Retix, Sun, 3Com, Unisys, others	Licensing charges for Alliance OSI products ranges from $30,000 up to $100,000
Unisys Corp. Blue Bell, Pa. (215) 986-4011	OSI FTAM, OSI MHS (2 software products)	Two application (Layer 7) implementations; one of FTAM, the other X.400, either or both of which run over Unisys' 2 lower layer OSI software modules (see below), on Unisys 1100/2200 computers running OS 1100 Base 3 operating system	FTAM, X.400 (1984); FTAM product features a menu interface to user, application interface consisting of COBOL calls; X.400 includes user agent, interfaces and APIs to user agent and MTA (for gateways)	See below for lower layer OSI software	Bull, DEC, DG, Fujitsu, Hitachi, IBM, NEC, NTT, Olivetti, Retix, Sun, others (X.400 and FTAM systems); CDC, HP, ICL, NCR, OSIware, Siemens, Wang (X.400 only); OKI, Sharp, Toshiba (FTAM only); plus 8 U.S. and foreign X.400 E-mail carriers	FTAM (Layer 7) costs from $14,000 to $65,000, depending on system configuration; MHS (Layer 7) costs from $29,000 to $137,000; requires both lower layer OSI software modules (see below)
	DDP-PPC and OSI-TS (2 software products)	Two software products which collectively provide OSI Layers 3 to 6 (plus Layer-7 ACSE) support for FTAM and/or X.400 on Unisys 1100/2200 computers running OS 1100 Base 3 operating system	Supports FTAM and/or X.400 at Layer 7, but also provides APIs to ACSE and session layer for customers writing own Layer-7 applications	OSI-TS provides Layers 3 and 4 support for Transport Classes 0, 2 and 4, CLNP and CONSover X.25 and Ethernet/802.3 LANs (connectionless only)	See above for full-stack testing of vendor's FTAM and X.400	DDP-PPC (Layers 5 and 6) costs from $14,000 to $68,000, depending on configuration; OSI-TS (Layers 3 and 4) costs $9,900 on any DCP system
US Sprint Communications Co. Reston, Va. (703) 689-6000	SprintMail X.400 (formerly Telemail) Public Network Service	Public X.400 network service, accessed by customers with X.400 systems via dedicated X.25 facility	X.400 (1984); user X.400 systems access SprintMail via an MTA-to-MTA link; Sprint is developing a 1988-X.400 P7 protocol to enable customer user agents to access SprintMail MTA	Packet-switched WAN facilities; uses Transport Class 0 over X.25	Bull, Convergent Technologies, Consumer Software, DG, DEC, HP, IBM, Retix, SoftSwitch, Sun, Touch, Unisys, Wang, Xerox (X.400 systems); over 20 U.S. & foreign-PTT E-mail carriers	Bundled pice for customers accessing via an X.400 link ranges from $750/mo. (up to 10 million E-mail characters) to $2,150/mo. (30 million characters); excludes cost of access facility
	SprintMail X.400; private E-mail network system	Currently offered package provides X.400 E-mail system on Tandem systems running Guardian operating system; being ported to other platforms running Unix System V	Same software features as public network service; see above	Same as above	Same as above for public network X.400 service	Private system cost starts at $100,000 (Tandem-based)
Wang Laboratories, Inc. Lowell, Mass. (508) 459-5000	Wang OFFICE/X.400 Gateway, VS WOSIS Core (2 software products)	X.400 (Layers 3 to 7) implementation that runs on any Wang VS system running VS 7.14.04 or later	X.400 (1984); however, as presently implemented, provides only for a gateway capability between X.400 networks and Wang OFFICE users	VS WOSIS Core (Layers 3 and 4) software supports all Transport Classes (0 to 4), CLNP over X.25 WANs and Ethernet/802.3 LANs	AT&T, Bull, DEC, DG, Dialcom, Sun, Unisys, U.S. Sprint, Xerox, others (X.400 systems); plus over 14 U.S. and foreign-PTT carriers/providers of X.400-based E-mail services	Wang OFFICE/X.400 Gateway (Layers 5 to 7) costs from $1,350 to $17,550 depending on system configuration; VS WOSIS Core (Layers 3 and 4) costs from $2,000 to $26,000
	VS WOSIS Transport & Session Services (TSS)	Transport and session (Layers 4 and 5) software that is designed to support user-written OSI application (Layer 7) programs on Wang VS systems running VS 7.14.04 or later	No inherent application layer; provides programming interfaces to transport and session-layer services for users to write/add own applications	Requires that software supporting Layers 1 to 3 be added by user, depending on specific network environments required	Only partial-OSI-stack testing	VS WOSIS TSS (Layers 4 and 5) costs from $1,500 to $19,500 depending on system configuration; additional software is required

NETWORK WORLD

Direct native-mode OSI networking products

Company	Product	Description/operating environment	OSI upper layer protocol support and interfaces	OSI transport/network environments supported	Interoperability	Price
Western Union Corp. Upper Saddle River, N.J. (201) 818-5000	Western Union 400; public network service	U.S. public E-mail service; supports direct links with customers' X.400 systems; alternately, provides gateway translation to/from customers' proprietary mail/office systems to X.400; connects with other X.400 carriers/services	X.400 (1984); customers' X.400 systems Private Management Domains connect on an MTA-to-MTA basis to the carrier's Administrative Management Domain via a dedicated X.25 link	Designed for X.400-to-X.400 message exchange over X.25 WAN links; gateways support X.400 access to/from proprietary mail formats, telex, fax, etc.	Consumer Software, DEC, Retix, SoftSwitch, Wang (X.400 systems); plus most other U.S. and many foreign-PTT X.400-based E-Mail carriers/services	Priced similar to non-X.400 E-mail and transport service; dedicated X.400 port charge of $500/month (plus access); usage from $.45 per 1,000-character message to $.68 per 3,000-character message
The Wollongong Group, Inc. Palo Alto, Calif. (415) 962-7100	WIN/LLS and WIN/ULS (2 software products)	Two software products which collectively provide Layers 2 to 6 (plus Layer-7 application service elements) on 386- or 486-based systems running Unix System V Release 3.2 or SCO Open Desktop, or Mac IIs running A/UX	Layer-7 modules — ACSE, ROSE and reliable transfer service elements — are designed to run with one of the vendor's Layer-7 applications (see below)	WIN/LLS (Lower Layer Services) supports Transport Classes 0 and 4, CLNP and CONS, the ES-IS protocol and LLC (IEEE 802.2) over LANs	Tests conducted with Layer-7 applications run on top of these software products; see below	WIN/ULS (Upper Layer Services) for Layers 5 and 6 (and Layer-7 service elements) costs $310 per copy; WIN/LLS (Lower Layer Services) for Layers 2 to 4 costs $200 per copy
	WIN/FTAM, WIN/MHS, WIN/VT and WIN/DS (4 software products)	Series of application (Layer-7) protocol implementations for 386- or 486-based systems running Unix System V Release 3.2 or SCO Open Desktop, or Mac IIs running A/UX; runs over WIN/ULS, and WIN/LLS (or else TCP/IP)	X.400 (1984), FTAM, X.500 Directory Service, and/or VTP; supports FTAM-1 and -2 files; X.400 includes SMTP gateway; WIN/DS includes DUA and DSA components	Layer-7 applications run over WIN/ULS, which includes a switch for either OSI transport (WIN/LLS) or TCP/IP networking; OSI transport is described above for WIN/LLS	DEC, DG, HP, IBM, Intel, NCR, Novell, OSIware, Retix, Sun, TITN, Touch, Unisys, others (X.400 and/or FTAM systems)	WIN/FTAM, WIN/MHS, WIN/VT and WIN/DS (all Layer-7 applications) each cost $310 per copy; require WIN/ULS (Layers 5 and 6) and either WIN/LLS or TCP/IP for transport (Layers 2 to 4)

ACSE = Association Control Service Elements
API = Application Program Interface
CLNP = Connectionless Network Protocol
CMISE = Common Management Information Service Element
CONS = Connection-Oriented Network Service
COS = Corporation for Open Systems International
DCL = Digital Control Language
DSA = Directory Service Agent
DUA = Directory User Agent
ES-IS = End System-to-Intermediate System
FTAM = File Transfer, Access and Management
FTP = File Transfer Protocol
GOSIP = Government OSI Profile
ISO = International Standards Organization
LLC = Logical Link Control
MAC = Media Access Control
MHS = Message Handling System
MMS = Manufacturing Message Specification
MTA = Message Transfer Agent
NIST = National Institute of Standards and Technology
NPSI = Network Control Program Packet-Switching Interface
PLC = Programmable logic controller
ROSE = Remote Operations Service Element
SCO = Santa Cruz Operation
SMTP = Simple Mail Transfer Protocol
SNDCF = Subnetwork Dependent Convergence Function
TLI = Transport Layer Interface
VTP = Virtual Terminal Protocol

FOOTNOTE:
(1) DEC also offers a combination VAX OSI Applications Package, which includes FTAM, MRX and OSAK, and costs from $9,371 (VAX 750/780 range) to $29,611 (VAX 9000 system); not available for MicroVAX or below.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

(continued from page 37)
tocol classes and types within those protocols are already emerging as clear, sought-after winners. The Transport Class 4 (TP4) protocol, for example, has become a cornerstone requirement for OSI products in the U.S.

What's more, some classes of protocols — for example, the Transport Class 0 (TP0) — have become the "default" protocol settings, or common denominators to which different OSI systems will automatically switch if they cannot establish a connection at the protocol class that one or the other has requested.

> Some classes of protocols have become the "default" protocol settings.
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At the transport layer, for example, two OSI systems connected over a LAN will first try to establish a connection using the TP4 protocol. If one of the systems doesn't support TP4, then it rejects a requesting system's effort to establish a connection using TP4. Both systems will then default to TP0.

Access to OSI

The real diversity in the OSI products available today lies in the applications and user interfaces that each vendor offers. The OSI standards in most cases do not spell out specific application program interfaces (API) or user interfaces, one or both of which are necessary to access and use the OSI protocols and services.

For example, the standards group that produced X.400 deliberately excluded a definition of APIs from its charter because members thought implementors should have the discretion to develop the access interface as they saw fit.

Vendors of today's OSI-based products have taken this to heart. This is good in some respects, but it also poses problems.

Take, for example, Digital Equipment Corp., which offers both X.400- and FTAM-based OSI products that run on DEC's complete range of VAXes under VMS (see chart beginning on page 38). In the absence of a standard method for programs to access X.400, DEC uses its own Digital Command Language (DCL) as the means of OSI entry for VAX-based applications.

Because DCL is well understood by the VAX/VMS community, its use as an access interface both to DEC's X.400 and FTAM products makes a lot of sense. It poses problems, however, in application portability between different vendors' OSI-based systems, as well as in the ability of users to port programmers from one system to another.

Because standard APIs have not been defined yet, OSI does not address application portability. Theoretically, software that is written in a commonly accepted version of a standard language should be able to run on any system with a compiler for that particular version of the programming language.

But OSI may confound that. For example, in the absence of a standard API, an application written for IBM's System/370 X.400 implementation — Open Systems Message Exchange (OSME) — cannot be ported without considerable software tweaking to a DEC VAX/VMS and being run over DEC's X.400 implementation, the VAX Message Router X.400 Gateway, or vice versa.

No threat yet

OSI clearly represents no threat to the job security of today's software programmers, at least not yet. The uniqueness of each computer vendor's operating system, command language and instruction set has perpetuated a multitude of system programming subcultures, and the current proprietary accesses to OSI will just add one more level to this caste system.

However, de facto standard APIs to OSI will emerge. The X.400 API Association, a consortium of system vendors and software houses, has already come up with a detailed framework for standardized program access to X.400. And OSI implementors are increasingly providing APIs based on it.

Clearly, no system vendor that has gone through the trouble and expense of developing or buying an OSI implementation wants to limit its product's appeal by offering just one means of program access, which may turn out to be the wrong one, given the unsettled nature of the OSI market. So most offer an assortment of accesses to their OSI stack.

IBM offers its huge System/370 customer base several program access options. Indeed, its OSI/Communications Subsystem (OSI/CS), recently delivered for both MVS and VM environments, includes no inherent application-layer protocol, but instead offers programs (and programmers) access at three different levels.

The first is an interface to the Association Control Service Element (ASCE), which is a Layer 7 entity but not an application protocol per se. ASCE is a utility used by such application-layer protocols as FTAM, as well as the Virtual Terminal Protocol and the Manufacturing Message Specification of MAP 3.0, to form a logical association with remote peers.

> IBM offers its huge System/370 customer base several program access options.
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Programmers would access ACSE if they were developing their own peer-to-peer applications, which would functionally supplant OSI application-layer protocols.

Besides ACSE access, OSI/CS also offers direct access to both the presentation and session layers of its OSI stack. Clearly, OSI/CS is designed for major end users and software developers who want to develop their own application-layer protocol, rather than plug in a ready-made one such as IBM's FTAM.

As shown in the charts, many system vendors offer user and program access at one or more of the layers of their OSI implementations. One reason for this is that the program interfaces to each underlying OSI protocol layer are clearly defined in the OSI specifications. This is unlike program access to the top of a seven-layer OSI protocol stack, which, as mentioned, can be implemented differently by each vendor.

Do it yourself

Because of these clearly defined interfaces, users can, with some systems programming effort and a lot of patience, assemble their own full seven-layer OSI stack with a reasonable chance of it working successfully. However, it is questionable whether that system would interoperate with another system running a similar piecemeal OSI implementation.

Systems programming expertise and an intimate knowledge of OSI protocols and software would be prerequisite to this undertaking. This doesn't necessitate hiring a staff of expensive OSI gurus, however. Many consultancies, as well as many of the software houses that specialize in

(continued on page 44)

Business calls from out here shouldn't pile up in your office.

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With ***EXECU-BILL***℠ *Service* from AT&T, calling card bills don't have to pile up anywhere. Because ***EXECU-BILL*** *Service* helps you manage calling card usage with a more efficient way of tracking and monitoring card expenses. Billing is custom designed to work the way your company works, whether you have one local office or many offices across the nation or around the world. So all that tedious paperwork is eliminated.

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NETWORK WORLD

X.400 gateways to and from proprietary E-mail formats

Vendor	Product	X.400 conversion to/from	Platform	Price
Control Data Corp. Minneapolis (612) 853-8100	CDCNet	SMTP (TCP/IP)	CDC Cyber	(1)
	OSI X.400 for 4000 Series	SMTP (TCP/IP)	CDC 4000 Series	(1)
Data General Corp. Westborough, Mass. (508) 366-8911	DG/X.400	CEO (DG)	DG Eclipse/MV Series	(1)
Digital Equipment Corp. Maynard, Mass. (508) 493-7161	Ultrix Mail Connection	sendmail (Unix)	VAX/VMS	$775 to $18,746, plus MRX (1)
	All-In-1 Mail Server	All-In-1 (DEC)	VAX/VMS	$505 to $32,473, plus MRX (1)
	Message Router/SNADS Gateway	SNADS (IBM)	VAX/VMS	$2,790 to $179,158, plus MRX (1)
	Message Router/PROFS Gateway	PROFS (IBM)	VAX/VMS	$2,046 to $85,646, plus MRX (1)
	Message Router/VMSmail Gateway	VMSmail (DEC)	VAX/VMS	$409 to $26,297, plus MRX (1)
Hewlett-Packard Co. Cupertino, Calif. (800) 752-0900	HP X.400/9000 and HP OpenMail	sendmail (Unix)	HP 9000 mini	$6,500 to $23,500, plus other software
	HP X.400/3000 and X.400/HP Desk	HP Desk (HP)	Dedicated HP 9000	$36,500 to $52,500, plus other software
IBM Armonk, N.Y. (914) 765-1900	X.400 DISOSS Connection	DISOSS (IBM)	System 370 (MVS)	$16,590 or $691 per month, plus OSME (1)
	X.400 PROFS Connection	PROFS (IBM)	System 370 (VM)	$13,650 or $568 per month, plus OSME (1)
	AIX OSI Messaging & Filing/6000	SMTP (TCP/IP)	RISC 6000 System	$2,500 to $12,000 (1)
OSIware Burnaby, British Columbia (604) 436-2922	Messenger 400	SMTP (TCP/IP), PROFS (IBM)	Many supported (VAX, S/370, Tandem, others)	Varies depending on system (1)
SoftSwitch, Inc. Wayne, Pa. (215) 640-9600	X.400 Gateways	OfficeVision, DISOSS, PROFS, S/3X, AS/400 (IBM); All-In-1, VMSmail (DEC); OFFICE, MailWay (Wang); DeskManager (HP); CEO (DG); OFIS Link (Unisys); sendmail (Unix); MHS (Novell/Action); Banyan Mail (Banyan); cc:Mail (cc:Software); Higgins Mail (Enable); Microsoft Mail (Microsoft); Telex, fax	IBM S/370 (MVS, VM) or 386 PC (with Unix V)	Typically $30,000 to $55,000 per gateway
Sun Microsystems, Inc. Mountain View, Calif. (415) 960-1300	SunNet MHS	SMTP (TCP/IP), sendmail (Unix)	Sun workstation	(1)
Touch Communications, Inc. Campbell, Calif. (408) 374-2500	X.400 Gateways, with Worldtalk/400	SMTP/uucp (TCP/IP), MHS (Novell/Action), cc:Mail (cc:Software), Notes (Lotus)	Any running Worldtalk/400 (typically a 286 LAN server)	$2,000 per gateway module, plus Worldtalk/400 (1)
	X.400 Gateways, with Worldtalk/400	QuickMail (CE Software), InBox Plus (Sitka/TOPS)	Mac II or SE	$2,000 per gateway module, plus Worldtalk/400 (1)
US Sprint Communications Co. Reston, Va. (703) 689-6000	SprintMail X.400 public network service	SMTP (TCP/IP); PROFS, SNADS, 3780 protocol (IBM)	User access via dial or dedicated link	Normal usage, plus $750 per port per month for conversion
Wang Laboratories, Inc. Lowell, Mass. (508) 459-5000	Wang OFFICE/X.400 Gateway	OFFICE (Wang)	Wang VS Mini	$1,350 to $17,550 for gateway; other software required (1)
Western Union Corp. Upper Saddle River, N.J. (201) 818-5000	Western Union 400 public network service	SNADS, PROFS, DISOSS (IBM); CEO (DG); All-In-1 (DEC); HP Desk (HP); OFFICE (Wang)	User access via dial or dedicated link	Normal usage charges, plus $295 for user site software
The Wollongong Group, Inc. Palo Alto, Calif. (415) 962-7100	WIN/MHS software	SMTP (TCP/IP)	386/486-based system or Mac II	$310; other software modules required
Xerox Corp. Sunnyvale, Calif. (408) 737-4312	X.400 Mail Gateway	XNS E-mail (Xerox), Courier (Xerox)	Xerox 8000 or 8090 network server	$9,995 for gateway software

CEO = Comprehensive Electronic Office
MHS = Message Handling System
MRX = Message Router X.400 Gateway
OSME = Open Systems Message Exchange
SMTP = Simple Mail Transfer Protocol
SNADS = Systems Network Architecture Distribution Services
XNS = Xerox Network System

FOOTNOTES:
(1) See main chart beginning on page 38 for more information on pricing.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

(continued from page 41)

OSI software (Touch Communications, Inc., TITN, Inc., OSIware, Retix and others) offer onsite services for this sort of job.

When mixing OSI protocols and communicating over partial OSI stacks, users must keep in mind these definite rules of networking:

- An application that runs over an X.400 stack on one OSI system will not be able to communicate with an application running over a different Layer 7 protocol (such as FTAM) on another OSI system, even though they have six of the seven OSI protocol layers in common.

In general, applications written to different OSI stacks probably wouldn't need or be expected to communicate. Applications using X.400 are seeking to send or retrieve messages or E-mail, while applications using FTAM are endeavoring to send or retrieve files, typically between a requester (or client) and server.

An X.400 application that needs FTAM-type services can be written to access FTAM as required — assuming that the system offers both X.400 and FTAM.

- Similarly, applications running on an OSI system that only has an X.400 stack will not be able to communicate with applications on an OSI system that only has an FTAM-based stack, and vice versa. Both systems will need a common OSI protocol stack, including the application layer.
- Applications running over a full seven-layer OSI protocol stack will be unable to communicate with applications operating over a partial OSI stack — for example, Layer 5 and below — even if both systems have compatible protocol implementations at Layers 5 and below.
- An application that accesses a partial OSI stack on one system should be able to communicate with an application on another system that accesses a partial OSI stack at the same layer.

"All you need is an equivalent stack up to that level," says Ian Smith, DEC's DECnet Phase V product manager. He adds that two applications can communicate over a partial OSI stack even if different APIs are used on two vendors' systems to access, for instance, the session layer. The software calls used to interface to the session layer would be those cited in the OSI specifications, however.

User concerns

Two major user concerns over OSI-based networking products are interconnectivity and interoperability. The difference between the two is important: A German can connect with a Frenchman by dialing a telephone number, and they can exchange words with each other. But unless they speak the same language, there won't be interoperability.

Similarly, it is possible to connect any two devices over an X.25 packet network. But even with X.25 accommodating their differences at OSI Layers 3 and below, there can be no interoperability without higher level understanding.

Different vendors' systems connected over a packet network have previously had to adopt relatively low-level device emulations — a VAX emulating a 3270 terminal to access an IBM host, for example. OSI's higher layer protocols considerably expand the communications capabilities of such disparate systems.

X.400 and FTAM represent two of these higher layer capabilities, enabling different vendors' OSI systems to interoperate as

> Two major user concerns over OSI-based networking products are interconnectivity and interoperability.
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peers or in client/server relationships for message exchange, file access, retrieval, transfer and so on.

Given current OSI products and the partial stack rules already detailed, it may make sense for users today to have all end-user applications communicate in an OSI network over full seven-layer OSI protocol stacks.

In time, there may be more use of partial OSI stack communications between different systems because of the performance gain that may be achieved, but it would not seem to be such a good idea today.

For example, applications that are written to the presentation, session and even the transport layer may be able to communicate using an underlying OSI network, but the services provided by the bypassed higher layers would not be available.

Profiles in confusion

Much progress has already been made toward standardized implementation blueprints in the form of implementation profiles.

Increasingly, profiles that delineate a specific set of OSI protocols and features are being drafted by large, influential user organizations. These serve as request-for-proposal specifications for vendors and ensure that OSI implementations that are bid support a minimal set of features that the user organization needs.

The most prominent among these are the Government Open

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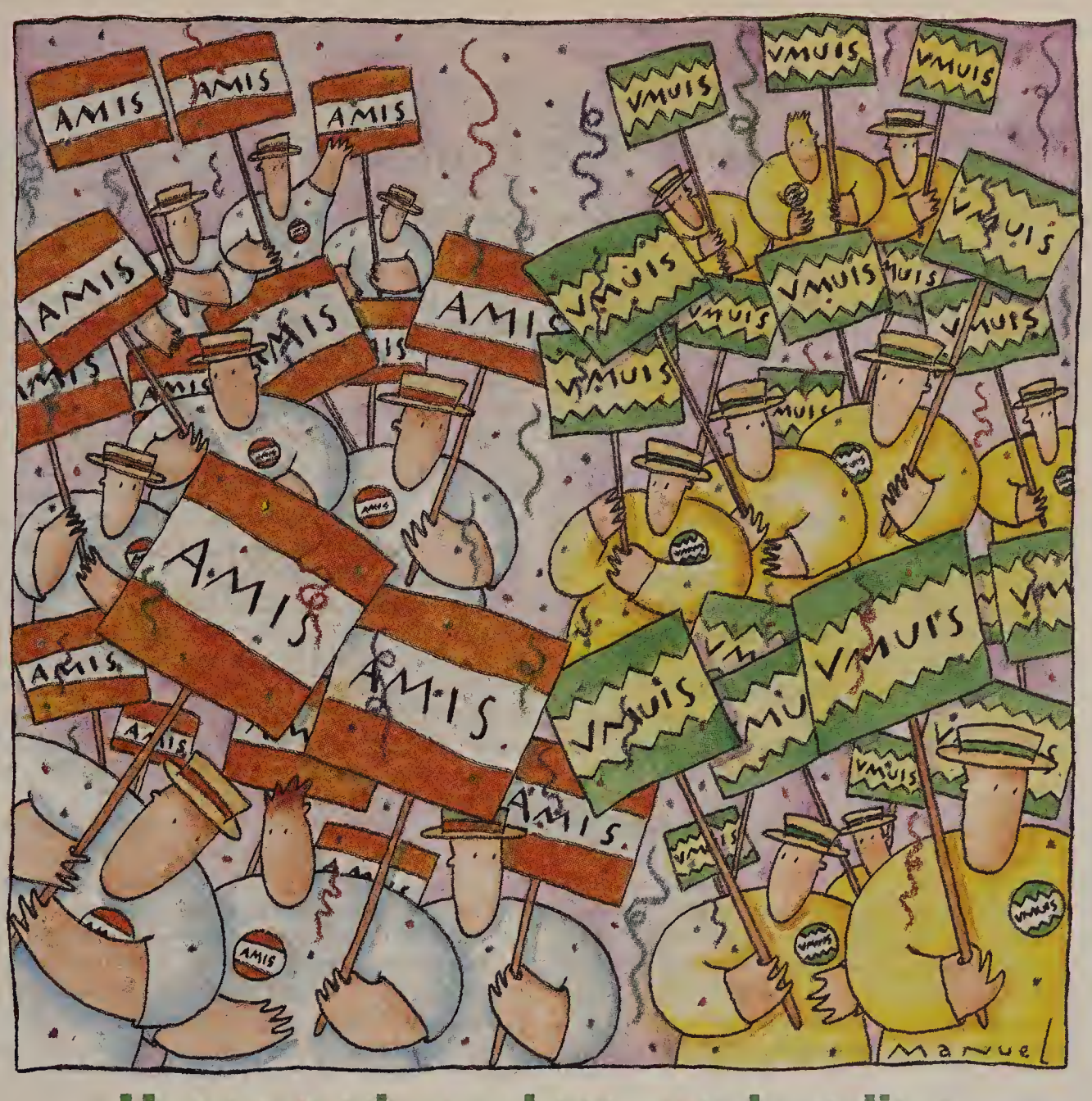
Standardizing voice messaging

By TOM FERMAZIN

This is the second part of a two-part Network World *focus on voice-messaging systems. The first part, a Buyer's Guide for currently available messaging systems, was published last week.*



Users and vendors are banding together to create and promote voice-messaging specifications.

The original goal of voice messaging was to make person-to-person communications easier. But a decade-long proliferation of manufacturers, proprietary architectures, platforms and interfaces has created interoperability problems and shown the need for a common user interface. It is hardly surprising, therefore, that a growing movement toward standards in the voice-messaging industry has begun.

The relatively brief history of standards within the voice-messaging industry dates back to mid-1987. The Coca-Cola Co. in Atlanta had installed voice-messaging systems from VMX, Inc. and Rolm Co., but users on one system could not forward voice mail messages to users on the other system.

After working with both vendors for a short time, Coca-Cola's voice mail system administrators realized that their efforts to communicate between dissimilar voice-messaging systems would benefit other companies and vendors as well.

In January 1988, a small group of users and vendors, including representatives from Coca-Cola, Eastman Kodak Co., General Electric Co. and Johnson & Johnson, met for the first time to discuss solutions to this problem. Later dubbed the Audio Messaging Interchange Specification (AMIS) group, the original members formulated a working model specification, then opened the group up to a broad range of interested users and vendors.

By mid-1988, Hatfield & Associates, a Boulder, Colo., consulting firm, was hired to manage the project, and an affiliation with the Information Industry Association (IIA), a group of users and vendors, was formed. In February 1990, the finalized version of AMIS was published.

AMIS is, in fact, not one specification but two: analog and digital. According to Bob Mercer, a principal with Hatfield & Associates, "There are two tiers of voice-messaging systems: the large stand-alone models and the small PC-based systems. [AMIS'] digital specification, based on the CCITT X.400 standard for electronic mail, is fine for large systems. But when you look at the additional memory, processing overhead and hardware required for a PC-based system to support the specification, it becomes eco-

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Fermazin is a senior technology analyst for Amoco Corp. in Chicago.

ILLUSTRATION ©1990 MANUEL KING

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nomically impractical. On PC-based systems, the analog spec makes more sense."

AMIS' digital specification defines how two voice-messaging systems with different architectures and technologies can send and receive voice mail messages in much the same way two computers send and receive E-mail. This is one of the reasons the digital specification is built around the X.400 standard.

The specification defines formats for addressing, message identification, sender and recipient IDs, time stamping, message attributes and a common digitized voice encoding algorithm. In addition, it provides for transmission of messages between systems at 9.6K bit/sec (V.32) and 56K bit/sec (V.35).

AMIS' analog specification is designed for transmission of voice mail messages over regular telephone lines on a dial-up basis. The analog specification uses dual-tone multifrequency control signaling and analog audio message transmission. While not as sophisticated as the digital specification, the analog specification supports the most common voice-messaging functions, including sending, receiving and replying to messages.

The two specifications have received largely favorable reviews throughout the voice-messaging industry. George Cole, director of marketing with Periphonics, Inc., a Bohemia, N.Y.-based artificial intelligence hardware and software manufacturer, says he sees AMIS specifically and standards in general as a win-win situation for users and vendors.

"We believe the maximum benefit to users and the maximum return on vendor development dollars comes from supporting the operations of products from various sources," he says.

Most manufacturers are either planning to comply with AMIS in the near future or closely monitoring the progress of other manufacturers within the industry. One maker of voice-messaging systems, Seattle-based Active Voice Corp., announced its compliance with the analog specification last December, nearly three months before the official specification was published.

Bob Greco, Active Voice's vice-president of product development, is enthusiastic about the specification. He says that in March, his company began shipping systems that meet the analog specification. Currently, about 20 networked Active Voice systems are installed at user sites. However, the specification won't take off until products from multiple vendors can be networked together. At least one other voice-messaging system manufacturer, Digital Sound Corp. of Santa Barbara, Calif., expects to comply with AMIS by year end.

The lack of AMIS participation among vendors appears to be only temporary, says David Ladd, executive vice-president of pioneer voice-messaging system maker VMX in San Jose, Calif., and chairman of the AMIS steering committee. "There's plenty of history for networking standards throughout the communications industry," he says. "The time is right for a standard within voice messaging. This will be a benefit to the industry."

A longtime standards proponent, Phyllis Hoffman, vice-president of marketing for Summa Four, Inc., a digital switch manufacturer in Manchester, N.H., and former manager of voice processing services at Southwestern Bell Corp. in St. Louis, says, "Any networking standard assists everyone in the industry. The user gains flexibility, while the manufacturers are freed from developing a different type of interface for every type of system."

While no one can say when full AMIS compliance throughout the industry will occur, it is likely that a critical mass of manufacturers will be reached some time next year, with a majority of firms meeting at least one of the two specifications by the end of 1991.

Most observers forecast a bright future for AMIS in spite of a few clouds on the horizon. One such cloud is that AMIS is not yet recognized by any standards

Making your voice mail system more effective

Many companies have successfully installed voice-messaging systems in their telephone networks, resulting in savings and productivity increases. Others, however, have spent thousands of dollars on the latest voice-messaging technology only to experience low usage and high levels of frustration.

"We definitely ran into some initial problems in getting people to use the system," says an airline telecommunications manager who preferred to remain anonymous. "For a while, we thought we had wasted our money."

The trick to getting employees to use the system, as many communications managers have discovered, is often just a matter of presentation and packaging. In fact, you can increase the efficiency and use of your voice-messaging system by following just a few simple rules. By heeding concepts such as "remember the human touch" and "keep it simple," you can encourage initially reluctant employees to use the system.

"When we installed our system, we definitely had a group of people who just did not want to use the system," says a telecommunications manager for a regional manufacturing company who also requested anonymity. "Many of them simply resisted the technology. For them, the hassles outweighed the benefits."

The bigger problem with voice messaging is that the zeal of the technology can be addictive for some managers. "Some companies get carried away with the technology," says Barbara Nolan, corporate communications manager for Voicemail International, Inc., a voice mail manufacturer and service bureau in Santa Clara, Calif.

"It's just like when the first automated teller machines came out. Many customers were scared that they were going to lose contact with their human bankers. Voice messaging is the same way: You can't just throw people into the technology and force them to deal with it," she says.

Implementation is the key factor that controls the success or failure of your voice-messaging system. By following a few simple steps and heeding a few basic maxims, you can maximize the efficiency of your system and reduce the frustration produced by changing telephone habits.

■ **Don't lose the human touch.** Too many systems carry voice technology to the extreme. Always provide callers with the option of speaking with a person.

■ **Don't let callers get stuck in voice-messaging loops.** Callers become frustrated if they keep getting sent from one mailbox to another. Always give them a way out.

■ **Decide whether your voice-messaging system will interact with customers.** Some firms allow it; some don't. The decision will dictate how complicated you make your voice messages and menus.

Companies that stress customer service often require that calls are always answered by a live operator. If the called party isn't available, the voice mail system is programmed to hunt station groups to find someone who is available.

For other firms, a more automated system may be required for various reasons, such as lack of personnel to answer the phone.

■ **Decide whether to use call forward.** Some private branch exchanges have a feature called "call forward all calls," which routes all calls directly to voice mail. Therefore, the caller isn't allowed to speak to an operator. Most firms rule out this option right away.

■ **Avoid system overload.** When using an automated attendant system that provides menus for callers, don't overload the system. If you have a lot of information to give, try to break it up. Use direct-inward dial lines whenever possible to split directories by division or departments. Break up alphabetical directories so callers don't have to listen to the entire roster before they get to a name beginning with Z.

■ **Simplify.** If you're going to use the table lookup function of a voice mail system, keep it simple. Everyone knows their zip code or telephone area code, so why have people memorize a 15-digit account number?

■ **Watch out for creating too many layers of greetings within your system.** One company had a message that greeted all callers to the main corporate number, one for each division, another for each department and, finally, one for each employee. It took each caller several minutes just to reach the intended mailbox.

■ **Keep it short.** Companies often provide too much unwanted information. Be sure that the information provides answers to questions callers are likely to ask. Again, try to give callers different phone numbers for different subjects.

■ **Test the voice mail.** Consider using a voice-messaging service bureau to test your firm's reception to the technology. If customers and employess don't like talking to machines, then it's best to find that out before spending $500,000 on equipment.

■ **Implement the system from the top down.** Get upper management sold, and everyone in positions underneath will listen. One firm first gave their top-level management the voice mailboxes to use. "There was some resistance, but [management] bore with it," says the telecommunications manager. "Then they implemented it downward in their divisions."

■ **Design a training program that matches the actual use of the system.** Most equipment providers supply buyers with a message system training manual. These manuals often contain too much information for the average user. Print a pocket-size manual listing the functions that a typical user would need, not all of the functions in the system.

Think of unique ways to package the instructions, such as on the inside flap of a company appointment calendar. Work voice mail training into the overall telephone training course.

■ **Consider who will use the system and who won't.** It doesn't make sense to give voice mailboxes to employees who don't have a telephone extension.

■ **Stick to spheres of influence in implementation.** If your system has limited capacity such that you can provide mailboxes to only a portion of your work force, make sure you give them to personnel in the same sphere of influence.

One manufacturer allocated only 20 mailboxes to a field office with 100 employees. The boxes were hardly used because people couldn't send messages to one another. When the company issued mailboxes to the other 80 employees, usage skyrocketed.

■ **Make sure your equipment is capable of message-waiting notification.** This is critical. Most telephone systems have either a message-waiting lamp or a stutter tone when you pick up the handset. Look for these when you buy new equipment. If telephones aren't capable of informing users that they have received messages, employees have to call their mailboxes on a regular basis. If they frequently find they have no messages, they call less often. Thus, when messages are left, they are not picked up for a while. This cycle will persist until no one uses the system.

■ **Use your reporting system.** Your reports of voice-messaging system usage are a valuable source of information. Use it to make your messaging system run better. One pharmaceutical firm thought reports were so important that its telecommunications department developed a special program to print specialized reports for management.

"Our managers use our reports to see who is using the system and how much," says the firm's telecommunications manager. "Look at one department that averages 30 hours per month per employee. Our report might show an employee that uses [voice mail] for five hours [per month] and one for 100 hours. Both figures should hop out at the manager — are these too low, too high or expected?"

Above all, be creative with your system. Think about all of the different bits of information that need to be disseminated in your firm. Press releases, corporate announcements and health or benefit plan updates all are common information needs for employees. Think constantly about how to make the system work for you. Look for new applications for the technology. The investment has been made; take advantage of it.

— Daniel Briere

body. It is a gentlemen's agreement among members of the AMIS group, and compliance is strictly voluntary on the part of manufacturers. Plans to rectify this situation are already under way. Representatives from the AMIS group met with their counterparts within ANSI in June to present a request to have AMIS adopted as an ANSI standard.

Hatfield & Associates' Mercer expresses another concern: "There is no conformance process in place now — no Underwriter's Laboratory to test various systems to ensure they meet the standard."

Mercer also indicates that some AMIS members were mildly opposed to using the 1984 version of CCITT's X.400 standard, instead of the current 1988 version, as the platform for the AMIS protocol model.

According to Mercer, the decision was justified because the later version would have imposed more complicated requirements on system developers and manufacturers without providing significant operational benefits to end users.

> AMIS does not address the issue of dissimilar user interfaces.
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User interfaces

While AMIS addresses the ability to network dissimilar voice-messaging systems, it does not address the issue of dissimilar user interfaces. Pressing "0" or "1" or some other key on their phone to reach an operator, for example, would seem to make little difference to users once they have learned to use the system.

However, if users work for a firm with multiple voice-messaging systems from different manufacturers or use one type of system at work and subscribe to another type at home, differences in the user interface could become confusing.

As with AMIS, a group of interested users, service providers and manufacturers banded together in June 1989 to form the Voice Messaging User Interface Forum (VMUIF).

In April, VMUIF accomplished its initial goal — to adopt a standard core of user interfaces that all voice-messaging systems would use. A document detailing the particulars of the VMUIF specification has been published and presented to the ANSI standards committee for adoption in the near future.

The VMUIF specification contains recommendations for assignment of keys, including "2" to send a message, "1" to activate the listen menu and "0" for help or to reach an operator. Other design principles are also included, such as the suggested limit of three or four options per menu and the sequence of menus.

However, the VMUIF specification has garnered its share of critics. A number of VMUIF participants have argued that the core of user interfaces should be kept to the barest minimum to allow individual manufacturers to develop innovative features. They fear that if every key on the push-button pad were included in the specification, manufacturers would be unable to create unique features and still comply with the specification. A list of concerns raised by participants is included in the 52-page VMUIF document.

VMUIF also has its staunch supporters. According to Greg Hawkins, director of marketing for voice-messaging system manufacturer Digital Sound, "Nearly every request for proposal we've seen from the regional Bell holding companies has asked for VMUIF compatibility."

Digital Sound plans to offer a class-of-service option that will allow users to choose the VMUIF or proprietary Digital Sound user interface on the systems it ships sometime around year end.

Future standards

AMIS and VMUIF are certain to be adopted by various standards bodies eventually, with other standards to follow. Probe Research, Inc., a Cedar Knolls, N.J.-based consulting firm specializing in voice processing technologies, has already submitted to the IIA a proposal to form a group that will determine common user interfaces for facsimile, similar to the VMUIF effort.

According to Chris Seelbach, senior analyst with Probe Research, a dozen firms have already expressed interest in joining the new group, which is scheduled to meet for the first time on Oct. 23 at the Mark Hopkins Hotel in San Francisco.

As technologies continue to converge, standards will play an increasingly important role in voice messaging. AMIS, VMUIF and other standards will shape the voice-messaging industry of the 1990s and beyond.

For a copy of the AMIS analog or digital specification, contact Hatfield & Associates, 4840 Riverbend Road, Boulder, Colo. 80301, or call (303) 442-5395.

For a copy of the VMUIF specification, contact the IIA (Attn: VMUIF), 555 New Jersey Ave. NW, Suite 800, Washington, D.C. 20001, or call (202) 639-8262.

For information about participating in the Fax Specification Group, contact Chris Seelbach, Probe Research, Inc., 3 Wing Drive, Suite 240, Cedar Knolls, N.J. 07927, or call (201) 285-1500.

LAN Manager without OS/2

continued from page 19

Microsoft." Olsen said he got the impression at a Microsoft training seminar that a generic version of OS/2 from Microsoft would be available through the same wholesale suppliers that were carrying Microsoft's LAN Manager product. However, it does not appear that will be the case any time soon.

"We don't have a packaged-product version of OS/2. We license it to hardware OEMs just as we do with DOS," said Stephen Kanzler, national marketing manager for Microsoft's network business unit. "It's a question of whether you can do such a version because OS/2 requires adaptation to each vendor's hardware.

"Microsoft does it for a few of the most popular machines, but we can't possibly accommodate them all," he added.

According to industry analysts Craig Burton and Jamie Lewis of the Clarke Burton Corp., Microsoft may have to come up with a hardware-independent version of OS/2 that accommodates at least 30 to 50 of the better known machines on the market and can be sold with LAN Manager and preferably bundled with it.

LAN Manager is up against Novell, which has had an eight-year head start. And although NetWare's hardware independence is not perfect, it is impressive.

"Meanwhile, OS/2 is very BIOS- and hardware interrupt-dependent," Burton said. "Microsoft is working on a hardware-independent version, but in our view, it is at least a year off."

> LAN Manager is up against Novell, which has had an eight-year head start. And although NetWare's hardware independence is not perfect, it is impressive.
>
> ▲▲▲

Lewis agreed. "There is no short-term quick fix for it," he said. "Microsoft is a babe in the woods now."

There are some people in the distribution chain who are not disturbed by the two-step purchasing process. One is Walter Albers, president of Micro Computer Services, Inc., a NetWare reseller in Hayward, Calif., that has applied to become a Microsoft Network Specialist.

"I've always used nothing but IBM's PC-DOS on NetWare LANs that have different types of workstations. I don't leave Compaq DOS on the Compaqs, AT&T DOS on the AT&Ts and so on. So I don't have any problem with getting the OS/2 for LAN Manager from a second source. I wouldn't buy it from anyone but IBM anyway."

IBM is not releasing a 1.21 version of OS/2 but is expected to announce its Release 1.3 very shortly. Also, according to Microsoft's Kanzler, there is an IBM Customer Service Disk upgrade that makes IBM's OS/2 Version 1.2 compatible with Microsoft's LAN Manager 2.0.

Albers said IBM's version of OS/2 seems to run well on the brand-name clones from companies such as Everex Systems, Inc. and Samsung Electronics Co., Ltd.

Novell down on duplication

continued from page 19

companies and corporate end users who illegally reproduce copies of stand-alone application packages.

Novell itself has initiated several copyright infringement suits against resellers in recent months, all of which have been settled out of court.

Last December, Novell settled copyright infringement suits against Vicom, Inc., a Los Angeles reseller specializing in medical billing packages, and Zielinksi & Associates, a St. Louis accounting firm. Both firms agreed to pay Novell an undisclosed amount in damages and agreed to audit customer sites and replace all infringing copies of NetWare.

> "We intend to do everything in our power to prosecute pirates to the fullest extent of the law."
>
> ▲▲▲

Novell has also formed an in-house piracy team, headed by former Federal Bureau of Investigation agent Gill Jarman, to investigate allegations of bootlegging and copyright infringement.

Bradford said the company is logging about 20 calls a week from people reporting tips on suspected NetWare bootleggers.

Admittedly, he said, many of the calls are red herrings, such as those logged by disgruntled ex-value-added reseller employees. But occasionally, the calls help shut down a thriving bootleg operation. Such was the case last month when the Novell piracy team received a call from a tipster who told the company to check on the operations of Micro Systems International (MSI) in Roebuck, Ala. Novell investigated and reported its findings to the FBI.

On Aug. 3, the FBI executed a search warrant at MSI based on the Novell lead and, working with Novell personnel, confiscated business records, hardware and software that had been used to make illegal copies of NetWare sold to users in Alabama, New Mexico, Mississippi and South Carolina.

A court case is now pending.

"We don't know what the end result of this or future cases will be, but we intend to do everything in our power to prosecute software pirates to the fullest extent of the law," Bradford said.

Users or vendors who wish to report suspected cases of software bootlegging can call the SPA's toll-free consumer hot line at (800) 388-7478.

Letters

continued from page 35

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Director of marketing
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Enough RAM cram

If I ever read another article about the alleged "DOS 640K-byte RAM limit" ("Beating RAM cram," *NW,* Aug. 6), I think I shall:

- Promptly trash the article in which I find this phrase.
- Pen additional tirades such as this.
- Tear my hair out.
- Secure an S100 CP/M machine with 8-in. drives as my primary workstation.

The 640K-byte random-access memory limit derives not from MS-DOS, but from the architecture of the IBM Personal Computer. MS-DOS runs quite nicely at a maximum of 896K bytes on my Digital Equipment Corp. Rainbow.

Tony LaRou
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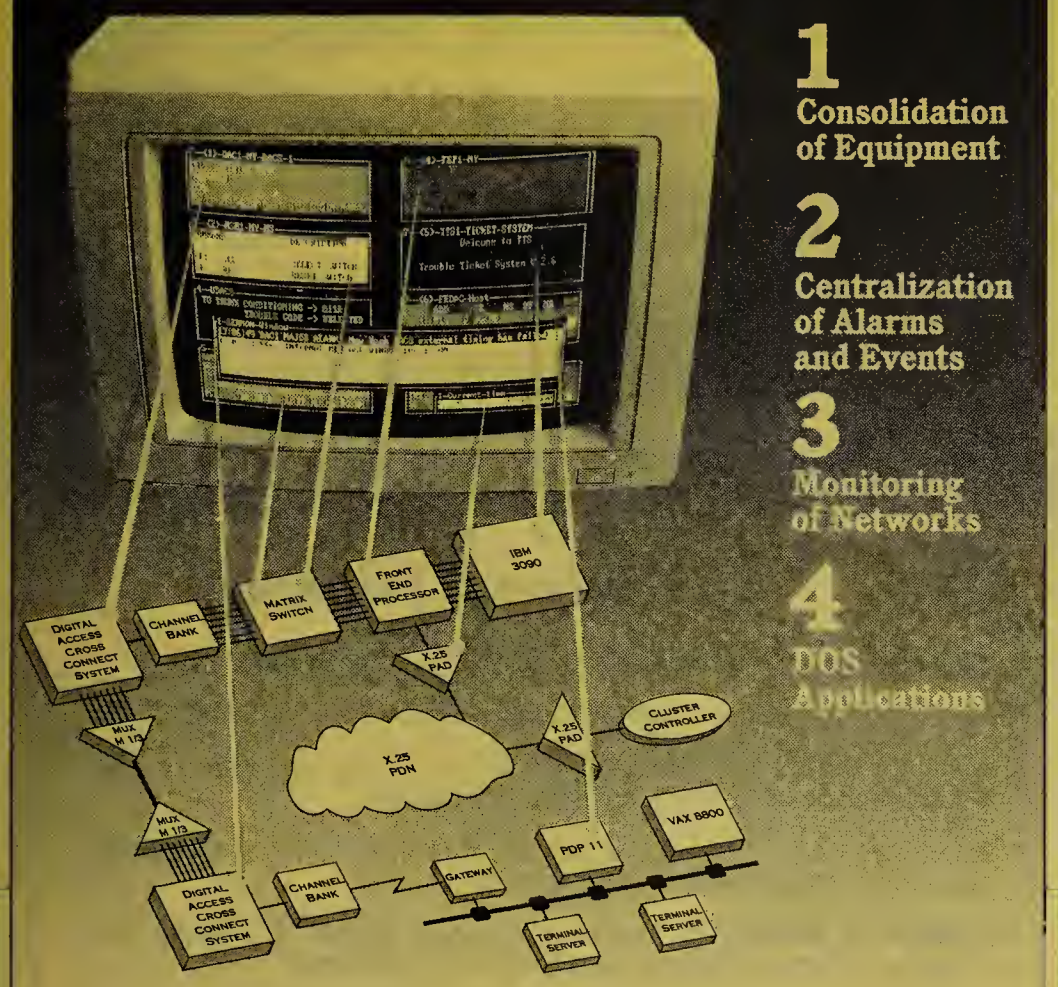

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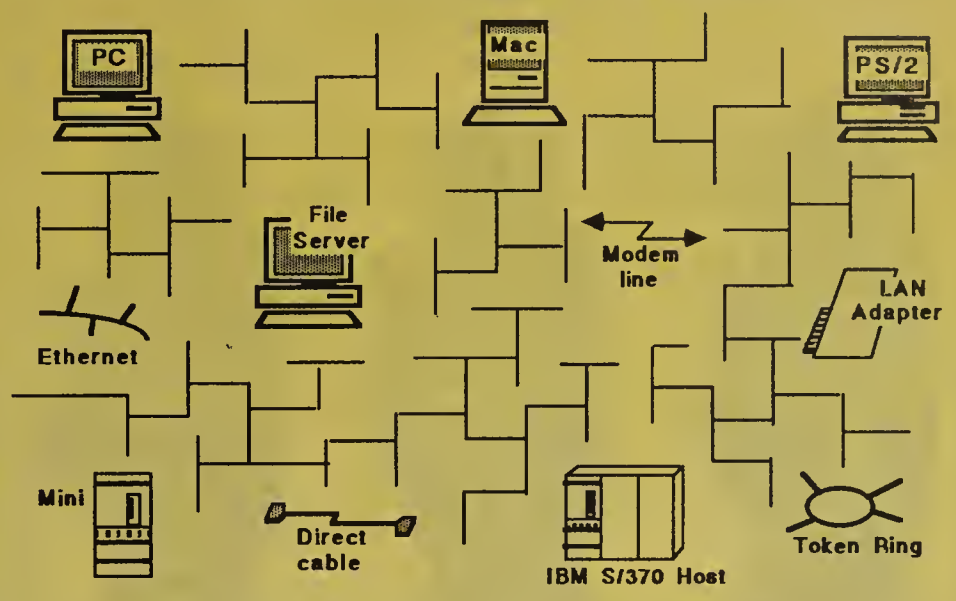

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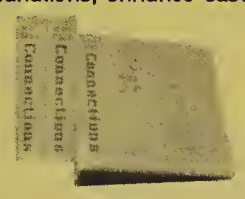

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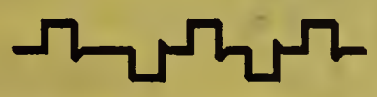

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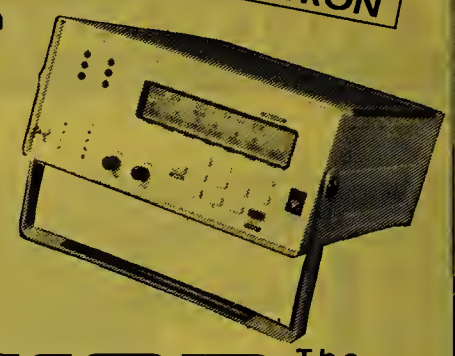

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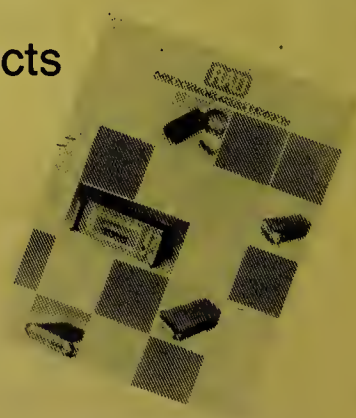

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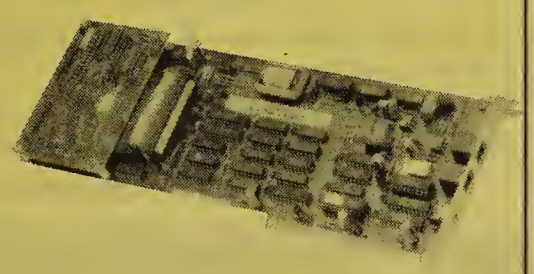

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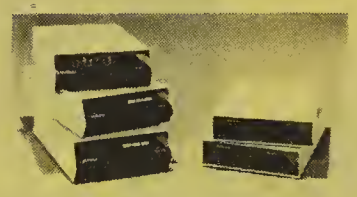

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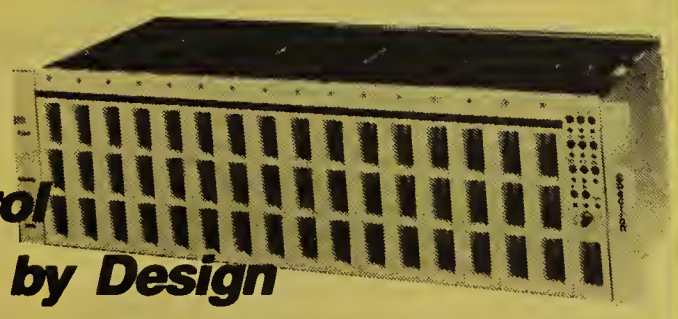

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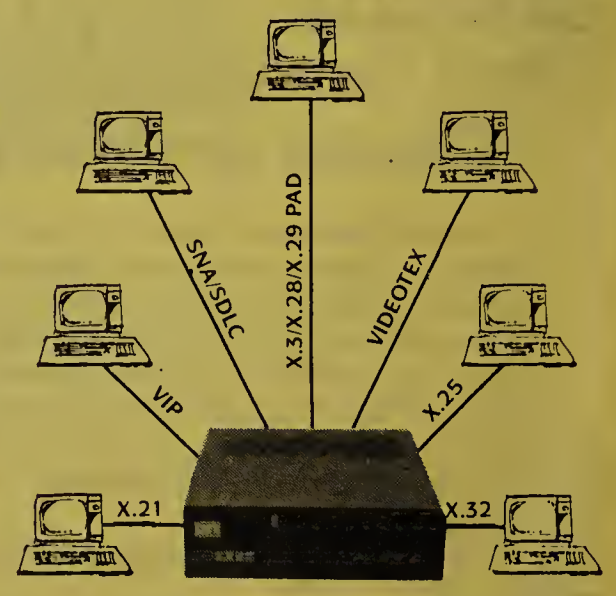

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See The FAXNeT Form on Page 33

OSI standards evolve

continued from page 44

Systems Interconnection Profile (GOSIP) and the Manufacturing Automation Protocol/Technical and Office Protocol OSI profiles championed by GM and The Boeing Co.

While these profiles contain many of the same protocol-layer components, there are also significant differences. At the application layer, for example, MAP calls for a version of FTAM — which reportedly is not interoperable with the formal OSI FTAM — and the Manufacturing Message Specification (MMS). Neither TOP nor GOSIP requires MMS, but both require X.400.

TOP additionally requires the Virtual Terminal Protocol and X.500 directory support, neither of which is required in the current version of GOSIP.

At the lower layers, MAP requires only LAN support (in particular, the IEEE 802.4 token bus and either carrierband or broadband media). MAP and TOP require X.25 WAN support, as well as LAN support (specifically IEEE 802.3 Ethernet). And there are many other subtle protocol requirement distinctions.

Supporting all available or planned profiles would require an awesome investment in development resources and then maintenance of a range of OSI products. Users need to standardize on one for their own organization.

Users may want to consider adopting GOSIP Version 1.0 specifications in their own OSI RFPs, as most vendors are likely to support it and the government plans to make available a data base of GOSIP-compliant vendors and products once a GOSIP testing program gets under way. That is scheduled to begin by year end. Users should, however, examine the GOSIP specifications in detail to make sure the profile meets their particular network needs.

Shrink-wrapped OSI?

As shown in the tables, the currently available array of OSI products takes many shapes and forms. It can generally be said that none are off-the-shelf packages that users can expect to simply load and run.

In some cases, such as with the OSI offerings from Control Data Corp. and NCR Corp., all of the OSI layers, including application-layer FTAM and X.400, are bundled into one package at one price. There may still be discrete software modules, but all are designed to load and work together.

Certain vendors, such as DEC and IBM, offer an assortment of OSI packages, some of which provide overlapping support for different OSI layers.

One problem users are likely to face is determining which package or combination of packages provide a composite OSI protocol stack that can be used. A thorough examination of each vendor's specifications will be necessary. DEC, for example, offers its OSI Applications Kernel (OSAK) software, which addresses only OSI Layers 3 to 5 and includes an open session-layer interface for program developers.

DEC also offers Layer 6 and 7 FTAM and X.400 products, which are sold with underlying OSAK Layers 3 to 5 included. The user will then have to add appropriate Layer 1 and 2 components for Ethernet or Layers 1 to 3 for X.25 WAN communications.

In some cases, APIs are included in the OSI software package price. In other cases, APIs are purchased separately in what are referred to as developer kits, which can cost from $2,000 to $15,000 or more by themselves.

According to a Mier Communications, Inc. projection that applies historical models to similar introductions of new technology, prices for OSI products should drop by as much as 50% within the next two years as development costs are recouped and sales begin to be realized.

It can generally be concluded that being able to offer an OSI implementation that meets the requirements of, for instance, GOSIP Version 1.0 is the primary objective of most of these vendors today. Two years from now, after users have gained some degree of OSI operational experience, performance and price will step to the forefront.

Other user issues

Prospective buyers of OSI products face two other significant issues. One is so-called "portable" OSI software, offered by such software houses as OSIware, TITN and Touch Communications. These are source code offerings, usually written in C and marketed primarily to OEMs and systems integrators.

In only a few cases are object code versions of these vendors' products for specific systems and operating environments offered for end-user consumption. Only large user organizations will consider buying source code packages, and they will need to do a fair amount of customized development in adapting these products to their particular systems.

The second major issue users face is that many of the OSI products offered today were designed and configured not to provide native-mode OSI networking for user applications running on the vendors' systems, but rather to offer a gateway into the OSI world from the vendor's particular proprietary office, document and E-mail applications. This is often the case, even though these products provide support for a full seven-layer OSI protocol stack. Additional software and hardware adapters are needed for Layers 1 through 3, however.

The gateway-only approach applies, for instance, to Wang Laboratories, Inc.'s Office/X.400 Gateway and IBM's OSME. These products serve mainly to link Wang Office, IBM Professional Office System (PROFS) and DISOSS users to an X.400 network and really don't enable users to hook their own applications to an OSI network.

That capability will undoubtedly come as industry-standard APIs are developed and with the wider adoption of the 1988 version of X.400, which offers key improvements in the area of remote communications over the now predominant 1984 version.

The gateway capability is an integral part of the OSI software from vendors such as Wang, but for others such as IBM, separate, additional software modules are required.

As shown in the X.400 gateway table on page 44, IBM offers one package for linking DISOSS users on MVS systems to its X.400 and another for PROFS users on VM systems. Similarly, DEC offers a set of software products, collectively referred to as MailBus, for linking many different office environments, as well as E-mail and message systems, with its X.400 gateway.

Included in the main OSI product table is a summary of each vendor's stated interoperability. The vendors were asked to provide a listing, broken down by application-layer stack (FTAM or X.400), of the other vendors with which their OSI products have been shown to interoperate.

Some vendors limited their responses to only formal interoperability testing (such as done in the Corporation for Open Systems International's Interoperability Lab or via the European Eurosinet test facility).

Others, however, included vendors with which they have achieved any degree of demonstrated interoperability (including at such demos as the 1988 Enterprise Networking Event). This is why one vendor may list another vendor's product as interoperable with its product while the second vendor might not include the first under its product's interoperability.

Today's OSI product marketplace is a bit like a new housing development with houses at various stages of completion. Some are habitable; others are still shells but rapidly being finished. And until there are formal testing procedures, such as those being developed by the National Institute of Standards and Technology, none can be issued a formal certificate of occupancy.

This article is based in part on the upcoming *Network World*/Mier Communications report, "OSI and GOSIP: Product Analysis and Planning Guide — 1990-1993." The report offers more in-depth information on OSI product development, including features and interoperability, for more than 20 leading vendors.

Readers may order the complete report by calling (800) 343-6474, ext. 427. Single copies cost $695; multiple-copy discounts are available. Prices include shipping and handling.

NETWORK WORLD

FTAM gateways to and from proprietary file formats

Vendor	Product	FTAM conversion to/from	Platform	Price
IBM Armonk, N.Y. (914) 765-1900	AIX OSI Messaging & Filing/6000	FTP (TCP/IP)	RISC System/6000	$2,500 to $12,000 (1)
Sun Microsystems, Inc. Mountain View, Calif. (415) 960-1300	SunNet OSI	Network File System (Sun)	Sun workstation	(1)
Touch Communications, Inc. Campbell, Calif. (408) 374-2500	Alliance OSI	FTP (TCP/IP)	Various supported (DOS, Unix V, Macintosh, AIX, others)	Licenses from $30,000; C language source code
The Wollongong Group, Inc. Palo Alto, Calif. (415) 962-7100	WIN/FTAM-FTP	FTP (TCP/IP)	386/486-based system or Macintosh II	$310; other software modules required

FTAM = File Transfer, Access and Management
FTP = File Transfer Protocol

FOOTNOTES:
(1) See main chart beginning on page 38 for more information on pricing.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

Mixed-protocol products

Vendor	Mixed-protocol environment	Product and description
AT&T Computer Systems Morristown, N.J. (800) 247-1212	Running NETBIOS applications on top of OSI Transport Protocols over LAN; implements TOP-NETBIOS Interface	AT&T StarGROUP LAN Manager Server is 386-based Unix server software (OSI is via Transport Layer Interface) and client software for DOS, OS/2 workstations
cisco Systems, Inc. Menlo Park, Calif. (415) 326-1941	Routing of OSI traffic in a mixed network, along with DECnet Phase IV, TCP/IP, (Novell, Inc.) Internetwork Packet Exchange (IPX), AppleTalk and X.25	AGS, MGS and CGS family of multiprotocol routers; proprietary platforms and software; network-layer routing
OSIware Burnaby, B.C. (604) 436-2922	Running OSI X.400 traffic over non-OSI transport networks, including TCP/IP, DECnet and SNA/LU 6.2	Messenger 400 is software that can run on many different platforms (such as IBM S/370, VAX/VMS, Unix V); alternate transport capability is integral
Retix Santa Monica, Calif. (213) 399-2200	Running NETBIOS applications on top of OSI Transport Protocols over LAN; implements TOP-NETBIOS Interface	OSI NETBIOS for Unix or DOS is software for 386-based Unix or DOS platforms; OSI-Transport Protocol consists of TP4 OSI transport-layer protocol, Connectionless Network Protocol, End System-to-Intermediate System, Logical Link Control-1 and Ethernet
3Com Corp. Santa Clara, Calif. (800) 638-3266	LAN-based OSI communications, mixed with XNS or TCP/IP traffic, to X.25 WAN; also, OSI front-end processing for non-OSI systems	GS/X.25 Gateway Router with OSI software (and/or XNS, TCP/IP software) is a proprietary 68020-based platform; network-layer routing
Touch Communications, Inc. Campbell, Calif. (408) 374-2500	Running non-OSI applications on top of OSI Transport Protocols over LAN; implements TOP-NETBIOS Interface	Alliance OSI software includes modules that support alternate transport capabilities; available for Unix, DOS and Macintosh systems
Wellfleet Communications, Inc. Bedford, Mass. (617) 275-2400	Routing of OSI traffic in a mixed network, along with DECnet Phase IV, TCP/IP, IPX, XNS (3Com) or X.25	FN, LN and CN family of multiprotocol routers are 68030-based platforms, proprietary software; network-layer routing
The Wollongong Group, Inc. Palo Alto, Calif. (415) 962-7100	Running OSI higher layer protocols/applications (including X.400, X.500 Directory, FTAM, or Virtual Terminal Protocol) over TCP/IP networks	WIN/Upper Layer Services and WIN/Transport Services Bridge are software modules for 386/486-based Unix platforms and Mac IIs (running A/UX)

GRAPHIC BY SUSAN SLATER

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

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Group rips users, vendors

continued from page 1

ing Barriers to Open Systems Information Technology," the group said proprietary systems increase costs for product acquisition, software development and maintenance.

The report added that proprietary systems also limit communications within a company and information sharing among users on disparate networks. Reliance on such systems also slows the adoption of new technologies.

"We need to take charge of our own destiny again by declaring global war against proprietary systems that hold data hostage. Systems entrapment is negatively impacting North American businesses and stifling creativity," the report stated.

The vendor side

The report condemned vendors for not developing open systems products — such as communications offerings that support the Open Systems Interconnection protocols — in a timely fashion.

"There are insufficient open systems — that is, vendor-neutral information technology products based on industry standards," the report stated. "Vendors with a vested interest will not move to vendor-neutral products until they are convinced of a reasonable market."

Bud Huber, manager of advanced networks integration at Hughes Aircraft, said vendors have done well to support such standards as the IEEE 802.3 local-area network, X.25 packet switching and X.400 electronic messaging standards. But he said vendors are dragging their feet in supporting standards for such things as File Transfer, Access and Management (FTAM), electronic data interchange, directory services and network management.

Paul Pinson, program manager in the open system program office at du Pont, said users must rely on a mix of black boxes to interconnect disparate systems and spend more time managing that equipment than focusing on how to use networked systems to gain a competitive edge.

"Everybody has interfaces, translators, protocol converters and all that stuff," Pinson said. "Each of them works 95% of the time. It's that other 5% of the time that drives us crazy."

Users need vendors to deliver common application program interfaces, operating systems, graphical user interfaces and network tools to ease the transmission of data across multivendor networks, Pinson said.

The report also laid blame with corporate management for supporting open systems in theory but seldom in practice. It criticized users for "business practices that encourage a tactical — that is a short-term — approach to solving business problems while ignoring key strategic integration issues."

The report emphasized that management, as well as technical and procurement personnel, must understand that open systems can serve business objectives.

"In order to promote vendor-neutral products, users will have to stop buying proprietary products and start buying vendor-neutral products," Huber said.

The report warned that unless companies adopt open systems, they will see their global competitive edge erode because they will lack the ability to share information on an enterprisewide basis.

Open proposals

While the report delineated barriers to open systems, it also offered proposals to overcome those barriers.

The report recommends that an open systems architecture user organization be established to identify user requirements without interference from vendors.

Such a group would be able to strongly influence vendor product plans through united recommendations.

The organization would work on OSI profiles, adopt common procurement policies and boost user participation in standards-setting activities. It would design user migration strategies to open systems and even suggest hiring guidelines in which candidates with open systems experience are favored over users of proprietary systems.

The report also advocates that each company adopt a five-year open systems migration plan to be reviewed every six months.

Barriers to implementation of open systems

1. The user community lacks a process to identify common open systems requirements.
2. The user community lacks a vehicle to exert collective pressure on vendors to meet those requirements.
3. Current attitudes and investments in existing systems and applications make it difficult to evolve to an integrated business information environment.
4. There are an insufficient number of open systems products based on standards.
5. Current business practices encourage short-term planning, as opposed to long-term integration issues.
6. There is no perceived linkage between achievement of open systems and accomplishment of business goals.
7. Inability to access or distribute data across an enterprise divides a business.
8. There is no North American vision of broad-based, enterprisewide integration and the role open systems will play.
9. There is no shared vision for establishing an open systems process.

GRAPHIC BY SUSAN J. CHAMPENY

Houston 30 members will discuss the report at their meeting next week in Warren, Mich. Several members said they also hope to use that time to discuss the possibility of merging the group with another open systems organization. They feel it will off-load some of the administrative burden members are beginning to feel.

Looking ahead

The Corporation for Open Systems International (COS), CAM-I, Inc. and X/Open are candidates for a merger. But Huber emphasized that no one group entirely encompasses the vision of the Houston 30.

COS, for instance, seems focused on open systems networking, while the Houston 30 is also concerned with elements such as operating systems and interfaces.

But Huber said COS is eager to accommodate their demands as a user group and that the possibility remains of the group voting to join COS at its next meeting.

Organizations active in the "Houston 30" open systems group

- ABB Lumus Crest, Inc.
- The Air Force Wright Research & Development Center/Manufacturing Technology Directorate, Integration Technology Division
- Amoco Corp.
- Boeing Computer Services Co.
- British Petroleum Exploration Co.
- CAM-I, Inc.
- Conoco, Inc.
- Deere Tech Services
- E.I. du Pont de Nemours & Co.
- Eastman Kodak Co.
- Exxon Chemical Co.
- Ford Motor Co.
- General Electric Co.
- General Motors Technical Center
- Gulf Canada Resources, Ltd.
- Hughes Aircraft Co.
- Industrial Technology Institute
- McDonnell Douglas Corp.
- Merck & Co., Inc.
- National Aeronautics and Space Administration
- National Institute of Standards and Technology
- Perley Technologies Corp.
- Raytheon Co.
- Rockwell International Corp.
- Sematech
- Tennessee Eastman Co.
- Texaco Refining and Marketing, Inc.
- 3M Information Systems and Data Processing
- Transport Canada
- Upjohn Co.

SOURCE: INDUSTRY COOPERATIVES SERVICES, INC., ANN ARBOR, MICH.
GRAPHIC BY SUSAN J. CHAMPENY

NIST falters in GOSIP test plan

continued from page 1

issue," said Kevin Mills, chief of the Systems and Architecture Division at NIST, who conceded that the conformance test program is off to a slow start. As a result, the quality of the abstract test suites, which are the basis of all GOSIP conformance test systems, "is not what it should be," Mills said.

NIST has yet to accredit any testing laboratories to evaluate the wave of GOSIP products hitting the market. Instead, vendors are taking it upon themselves to conduct interoperability testing and conformance evaluations using third-party test systems that have not been certified by NIST.

Vendors cannot market products as GOSIP-compliant until they meet standards set by accredited labs, Mills said.

NIST expects to accredit a series of GOSIP testing laboratories, which would be operated by vendors testing their own products or by independent third parties, by mid-November.

"We'll have one [conformance testing] system, however flawed, by Nov. 15," Mills said.

Nine labs, operated by IBM, Hewlett-Packard Co., the Corporation for Open Systems International (COS) and others, are seeking accreditation.

However, while those labs will be able to test equipment specified by GOSIP Version 1 — X.400 Message Handling Systems, File Transfer, Access and Management (FTAM) software, IEEE 802.3, 802.4 and 802.5 local-area networks, and X.25 packet-switching gear — they will not be able to assure users the results are accurate since the test systems will not meet NIST's technical requirements.

Despite the lack of confidence in the test suites used to develop GOSIP conformance test systems, NIST will classify products as GOSIP-conformant if those products pass tests administered by accredited labs.

A late start

According to Mills, NIST realized in April 1989 that it needed to establish its own testing program to develop the necessary test suites for conformance test systems.

"We were lulled to sleep" by OSI industry initiatives such as those at COS, which failed to produce test systems, Mills said.

In November 1989, NIST asked the private sector to submit for approval their proposals for GOSIP Version 1 abstract test suites, which are used to build conformance test systems. To its disappointment, NIST discovered a dearth of OSI testing technology, particularly in the U.S.

Only a handful of suppliers answered NIST's call for test suites. These included the European-based Open Systems Testing Consortium; Consultative Committee on International Telephony and Telegraphy and Institute of Electrical and Electronics Engineers, Inc., two international standards bodies; and COS, the only U.S. group to submit a proposal.

Although none of the abstract test suites fully met the GOSIP requirements, NIST decided to approve them provisionally until better tests were developed.

"Our plan is to stage improvements in the test systems and products over time," Mills said, adding that he hopes the problems will be solved in 1991.

Roy Rosner, president and chief executive officer of GSI-Danet, Inc., which submitted tests to NIST for approval, said the NIST conformance test systems effort stumbled in part because, during meetings with NIST, various parties could not reach a consensus on a universal test system.

> The quality of the abstract test suites, which are the basis of all GOSIP conformance test systems, "is not what it should be," Mills said.
>
> ▲▲▲

GSI-Danet recently announced that NIST has confirmed that the company's test systems meet current conformance testing requirements and will be certified for use in testing labs. Several other companies, including COS, Idacom Electronics, Ltd., The Networking Centre, Tekelec, Inc. and TITN, Inc. are also waiting for NIST to rule on their test systems.

Mills said that by the end of 1991, NIST expects another major set of test systems to be ready in time for GOSIP Version 2, which will include virtual terminal applications, ISDN and other requirements.

NIST wants to time the upgrade on Version 1 testing suites to coincide with the availability of Version 2 tests so vendors will be able to complete all of the testing at that time.

According to Mike Corrigan, head of the General Services Administration's Telecommunications Division, users will manage even though the NIST conformance test program has gotten off to a rocky start.

Corrigan pointed out there was never a test suite for the Transmission Control Protocol/Internet Protocol standard and that didn't stop the government from successfully using the standard.

"If you wait until eveything is the way it's supposed to be in an ideal world, GOSIP would never happen," he added.

IBM software enables data to move between PC, host

By Tom Smith
New Products Editor

WHITE PLAINS, N.Y. — IBM last week released an enhanced version of a personal computer software product that allows users to transfer data between personal computer and host-based applications.

The software, Windows Connection 2.0, has been enhanced to work with Microsoft Corp.'s Microsoft Windows 3.0 windowing environment and is now capable of supporting 5250 terminal-emulation software for communications with IBM Application System/400 minicomputers.

The new release also offers enhanced capabilities for transferring data between personal computer and host applications.

Windows Connection, which runs on DOS-based IBM Personal Computers or Personal System/2s, previously ran under Windows/286 3.1 and Windows/386 2.1, supported only IBM 3270 terminal-emulation programs and offered limited communications ability between personal computer and host applications.

New features with Windows Connection 2.0 include support for the Dynamic Data Exchange (DDE) protocol used in Microsoft Windows. With DDE, users running a personal computer application, such as one designed for word processing, can simultaneously update a host data base as they enter data into their personal computer application.

IBM also bolstered users' ability to copy and paste data between the personal computer and host applications. In the past, users could only paste a screen full of host data into a personal computer application. Now users can select, either from a host or a personal computer application, only a portion of the data and paste that data into the other window.

Finally, IBM announced that Windows Connection 2.0 allows the personal computer to support the transfer of multiple files to the host simultaneously. In the past, users could transfer only one file at a time.

In a typical application of Windows Connection 2.0, a user running Aldus Corp.'s PageMaker on the personal computer, for example, might use the software to access and import graphics from a host application when composing a newsletter.

The software will be available Sept. 28 for $214 in single-unit quantities. Version 1.0 users can upgrade to the new version for $85.

3Com to open net product line

continued from page 1

"Our approach is [to take] advantage of the best technology available today," said Les Denend, executive vice-president in charge of product operations at 3Com.

The NetWare support in particular gives 3Com more of a neutral stance in the network operating system wars between Novell and Microsoft, positioning the company to take advantage of any success either NetWare or LAN Manager enjoys in the future. 3Com codeveloped LAN Manager with Microsoft.

The SynOptics alliance involves a product exchange through which 3Com will resell SynOptics' System 3000 intelligent Ethernet wiring hubs and SynOptics will resell 3Com's Ethernet adapters.

According to William Lanfri, vice-president of business development for SynOptics, this mutual reselling should help boost sales for both companies since they have developed slightly overlapping but largely distinct distribution channels for their products.

The agreement also calls for a technology exchange that will enable each company's network management systems to manage the other's products. "We'll be managing their boards, and they'll be managing our hubs," Lanfri said.

In addition, the agreement paves the way for 3Com to start building internetworking modules — such as bridges, routers and communications servers — that will plug into the System 3000 hub.

This trend toward integrating what have traditionally been stand-alone devices into intelligent wiring hubs saves both component cost and space since the modules share a single power supply and chassis.

It also simplifies network management and provides a more flexible architecture for segmenting large local-area networks as changing traffic patterns or security needs dictate.

The NetWare support will be available in the first quarter of 1991. Frank Howley, product manager for 3Com's Workstation and Server Division, said 3Com will not be bundling NetWare 386 with the 3Servers. Rather, the necessary 3Server drivers will be developed for NetWare 386, and 3Server customers can obtain them through Novell's regular distribution channels.

3+Open Connection

The NetWare announcement last week was accompanied by the release of 3+Open Connection for NetWare. Introduced last June, it enables personal computer users running 3+Open client software to access both 3+Open and NetWare servers on the same LAN.

3Com also announced 45-day availability of the Intel Corp. 80486-based 3Server/600 and an 80486 upgrade board for existing 80386-based 3Server/500 machines. The cost of the 3Server/600 starts at $24,995, and the 486/33 Option upgrade costs $5,995.

Together, these products will give both NetWare 386 and LAN Manager a more powerful hardware option than was afforded by the existing 3Server line. According to Howley, 3Com benchmarks show a 50% performance improvement when the server is handling typical office automation software.

Corning Asahi turns the corner

continued from page 1

Corning Asahi was recently named winner of the 1990 Industry Leadership and Excellence in Application and Development (LEAD) award by the Computer and Automated Systems Association of the Society of Manufacturing Engineers. The award is given annually to a company that demonstrates leadership in the application and development of CIM technology.

Previous LEAD award winners include Deere and Co., General Electric Co., Martin Marietta Energy Systems, Inc. and Texas Instruments, Inc.

In 1985, Corning Asahi — a joint partnership between U.S. Corning, Inc. and Asahi Glass Co. of Japan — drafted a five-year CIM strategy that was projected to reduce manufacturing costs by $50 million and cut in half the number of defective parts built at the plant, according to Jack Fulton, project manager of manufacturing and quality.

At that time, the plant was using just one Digital Equipment Corp. VAX processor to control its three glass melting furnaces. Now processing power has expanded fourteenfold and more than two-thirds of assembly line operations are controlled or monitored by computers, Fulton said.

According to Mitchell, "Our glass melting and forming process is now a scientifically controlled operation rather than an inexact art form."

Corning Asahi's CIM architecture features three levels of networked processors. Computers and controllers on the first two levels manage factory floor operations, and a VAX cluster on the third level supports a variety of business and engineering applications.

About 150 users in corporate departments throughout the plant, such as purchasing, information systems and engineering, access applications on the VAX cluster via a DECnet network.

This network is bridged to a second DECnet that supports about 20 Level 2 processors, typically VAX minicomputers. Each Level 2 VAX is linked to a Level 1 controller or network of controllers on the shop floor.

The shop floor controllers run devices performing assembly line operations, such as glass melting, pressing and inspection. For example, these controllers might operate devices that open and close air and pressure valves used to control temperatures within a glass furnace.

Controllers are interconnected with a variety of networking systems, including Allen-Bradley Co.'s Data Highway II, Ethernets and Moore Products Co. Links Line networks.

In addition to managing factory floor devices, Level 1 controllers continually pass data such as temperature and pressure readings to Level 2 VAXes, which are responsible for coordinating and monitoring specific assembly line operations.

Plant floor operators program the VAXes to send instructions to the Level 1 controllers. These instructions might include the number of parts to be produced and at what tolerances, or the frequency with which valves should open and close.

In addition, the Level 2 VAXes periodically send data collected from shop floor devices to an Ingres Corp. relational data base that resides on the VAX cluster at Level 3. This data base contains information on more than 2,500 variables of the manufacturing process.

Corning Asahi engineers continually analyze the data base information to fine-tune the manufacturing process. This enables the company to operate the assembly line more efficiently and produce fewer defective parts.

Before introducing CIM, Corning Asahi reevaluated its manufacturing operations to see where they could be simplified. The firm was able to eliminate 50 steps in its manufacturing process for a total of 215.

"We wouldn't have gained half as much from CIM if we didn't simplify our [assembly line] processes before automating them. Many companies fail to do this," Fulton said.

Fulton estimated that 65% of the cost savings the company has achieved since 1985 are from improving the manufacturing process and 15% are from automating existing processes. About 11% of the gains are the result of producing fewer defective parts through controlling the assembly line operations more scientifically.

In wasting fewer parts, the company has been able to reduce its inventory of parts and raw materials needed to make goods.

Fulton said implementing CIM was only half the challenge; the other half was adapting the company's work force to a highly computerized operation.

Employees now spend 6% to 7% of their total working hours in training, learning how to use computerized equipment and how to work more independently in a nontraditional manufacturing environment, Fulton said.

"We have empowered people on the factory floor to take advantage of the new computerized environment," Fulton said. "As a result, our union doesn't see automation as a threat, but as an opportunity to improve the quality of manufacturing jobs at the plant."

NCR set to demo wireless LAN

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928 MHz within a radius of 800 feet. This means all nodes in a WaveLAN network must be within 800 feet of one another.

NCR said it is developing a board for the Micro Channel Architecture bus. The company is planning to release software drivers that will enable the board to work with client software supporting IBM's Network Basic I/O System and Microsoft Corp.'s LAN Manager next year.

WaveLAN is best suited for open offices where workers are housed in cubicles. While WaveLAN signals can travel through glass and cubicle partitions, obstructions such as cement and metal walls will severely degrade the signal, NCR said.

The board uses Ethernet's carrier-sense multiple access with collision avoidance (CMSA/CA) technique, which means a node can only broadcast data when no other node is broadcasting. This helps avoid packet collisions.

Most LANs operating over cables use another Ethernet technique called CMSA with collison detection. CMSA/CD allows several nodes to simultaneously transmit data packets and can detect when two packets collide on the wire. Since the collision destroys data, the nodes sending those packets must retransmit.

WaveLAN networks can also be linked to Ethernet, token-ring or Arcnet backbone networks running over coaxial or twisted-pair wires. To accomplish this, users must install a WaveLAN board in a network bridge that also supports an Ethernet, token-ring or Arcnet adapter board. When WaveLAN data is received, it travels across the bridge's bus to the board supporting access to the wire-based LAN.

Each connection to WaveLAN costs $1,390. The product is now being shipped to an undisclosed number of beta-test sites. NCR said users do not need a Federal Communications Commission license to operate WaveLAN.

NCR Comten to add FEP for SNA

continued from page 2

The upgrade issue, however, may not concern all users of low-end 3745s. The IBM 130 and 150, for example, are often used as remote concentrators, so it is not likely they would need to be upgraded to a machine the size of a 3745 Model 210 or 410.

Like the low-end 3745s, the 5645 can be used as a remote concentrator or in data centers where only a limited number of lines or mainframe channel connections are required, according to Linvel Karres, director of product management for NCR's network products division.

For the latter application, the upgrade capability is significant, said Joe Dooley, product manager for the 5645. "We are providing the capability to upgrade at the customer's convenience, unlike IBM, which locks customers into a 170 and [requires them] to replace the whole box if they upgrade to a 210 or a 410."

Karres said the 5645 also offers greater performance than the IBM machines. When the 5645 is compared head-to-head with the IBM 3745 Model 210 in a similar configuration, it performs roughly the same in terms of user response time.

Published IBM figures indicate that the Model 170 offers only about 70% of the power of the company's 3745 Model 210, Dooley said.

"Our [56]45 starts out with higher processing power and is upgradable," he said.

The extra processing power allows users to attach more devices or trunk connections to the front end while maintaining acceptable levels of response time.

Also, like other NCR Comten 56X5 processors, the 5645 can attach directly to an Ethernet, a feature IBM front ends lack.

The new processor runs all the same software as its predecessors, including NCR Comten's Network Control Program (NCP) Version 5.2, which is one release behind IBM's NCP Version 5.3. NCR Comten said it is working on its next release to close that gap.

The 5645 also runs NCR Comten software that supports Transmission Control Protocol/Internet Protocol networks. Later this year, NCR Comten is due to come out with software that gives its 56X5s support for Open Systems Interconnection nets.

NCR Comten claims that linking Systems Network Architecture nets with TCP/IP and OSI nets by running dual protocol stacks in the front end saves mainframe cycles as compared to the IBM method of supporting TCP/IP and OSI, which is via mainframe software.

Karres said NCR Comten will start phasing out its previous low-end processor, the 5620XP, at the beginning of next year.

Available now, the NCR Comten 5645 starts at $59,000 for a configuration that will support 16 9.6K bit/sec full-duplex communications lines. Network Interface Adapter (NIA) modules, which support a maximum of four token-ring or three Ethernet links, cost $11,000. Local-area network interface cards are priced at $3,000 each. Ethernet interfaces require one extra $5,000 controller card per NIA module.

IBM, NCR Comten front-end comparison

Product	Channel-connected hosts	Lines	T-1 lines	Token-ring LANs	TCP/IP Ethernet LANs	Main storage	Price
Comten 5645	4	128	4	16	12	4M to 16M bytes	$59,000 (Includes peripherals to support 16 9.6K bit/sec full duplex lines.)
Comten 5655	8	512	16	64	48	4M to 16M bytes	$122,100 (Includes peripherals to support 32 9.6K bit/sec full duplex lines.)
IBM 3745 Model 130	4	0	2	4	0	4M bytes	$20,600 (Does not include peripherals.)
IBM 3745 Model 150	0	16	1	2	0	4M bytes	$42,180 (Includes peripherals to support 16 9.6K bit/sec full duplex lines.)
IBM 3745 Model 170	4	112	2	2	0	4M bytes	$56,295 (Includes peripherals to support 16 9.6K bit/sec full duplex lines.)

The figures for connectivity options are maximum numbers for each category and cannot be achieved simultaneously on a single machine.

GRAPHIC BY SUSAN J. CHAMPENY — SOURCES: NCR COMTEN, ST. PAUL, MINN., AND IBM, RYE BROOK, N.Y.

Net architecture helps utilities

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able to share it, Shea said.

"Why can't anyone in the utility who wants information on power flow get it? Because not all of the computers are connected to the network. OSI will allow this," Shea said.

MAP attempted to solve many of the same problems for assembly line manufacturers, but it lacked some of the real-time connections that are needed for the utilities industry.

Shea said interconnection of computers will help eliminate duplicate efforts when compiling data bases. It will also help boost efficiency by giving people instant access to information that otherwise might take weeks to get.

PG&E, for instance, would like its customer service personnel to have access to real-time data collected by Supervisory Control and Data Acquisition systems, which monitor power plant devices, kilowatt outputs and transformer temperatures.

Nevolo said sharing the information would allow "the business side of the house to deal proactively with the customer. We want some of the information available to marketing people so they can talk intelligently to industrial clients."

Phased approach

The release of the UCA specification represents only the first phase of EPRI's long-term OSI project.

EPRI's Malcolm said the institute's work on open systems will continue far beyond last week's introduction of UCA Version 1.

In the second phase, the Hon-eywell Sensor and System Development Center will work as a consultant on-site at Northern State Power Co. in Minneapolis to establish a set of specifications for the Data Access Integration Services (DAIS).

DAIS is a collection of services that facilitate access to data among diverse systems in an electric utility's communications net through relational data base management systems, distributed data bases and file systems.

While UCA Version 1 has established the open systems structure for power plants, DAIS will develop uniform procedures for describing and accessing data within an electric utility. It will also provide specifications for a software system to support the procedures.

DAIS is targeted for completion in May 1991.

Phase 3 of the project, due out by December 1993, will provide for demonstrations by vendors of OSI-based offerings in about 10 utilities. EPRI is expecting that vendors, through the demos, will prove that the plan works.

"We're also getting the gas and water companies' support in UCA as well," Malcolm said, noting that UCA versions may eventually be drawn up for those utilities.

IBM offers OS/2 interface

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any of the announcements.

Also next week, IBM is expected to announce a new pricing structure for NetView that obviates the need for users to install a full version of NetView on every networked mainframe.

On most mainframes, users will run only the NetView components that support local automation, problem data recording and alert forwarding. Those components will forward net management data to a central or regional mainframe, which will run a full-blown version of NetView.

"That's something people have been clamoring for for a long time because they can't afford to put a copy of NetView on every single host they've got," said James Herman, a principal at Northeast Consultancy Resources, Inc. in Boston.

The new pricing structure will be effective Dec. 31 of this year for MVS and in March 1992 for VM, sources predicted.

Netwise unveils RPC tools

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RPC provides mainframe and microcomputer programmers with a high-level application program interface. To use the RPC, for instance, C programmers write a routine as if they were trying to initiate a task on a local workstation or server. When a request for mainframe data or a service is made, the RPC converts it to a standard data format such as the Open Systems Interconnection's Abstract Syntax Notation.1 (ASN.1).

The RPC then establishes an LU 6.2 session between the LAN device and an IBM host and passes along the request. The mainframe RPC converts the ASN.1 data to a host format and passes it to the COBOL program, which processes the request.

Available now, Netwise Mainframe RPC costs between $100,000 and $200,000.

The new Netwise RPC Tool for Macintosh runs under the Macintosh System 6.0 operating system on Macintoshes linked to Transmission Control Protocol/Internet Protocol nets. It is used by developers that build applications using Symantec Corp.'s Think C development environment.

Applications built using Think C and Netwise RPC Tool for Macintosh enable Macintosh users to initiate processes on other systems residing on a TCP/IP network that support Netwise RPC Tool software. The product will be available by November for $3,200.

Netwise also announced an RPC application development analysis tool that debugs RPC-based applications. The DOS-based RPC Monitor package features a menu-driven graphical user interface that enables programmers to view how an RPC-based application is processed.

Running as a Microsoft Corp. Microsoft Windows 3.0 application, RPC Monitor displays the connections between RPC applications and the actual commands that are invoked to accomplish the task. This helps developers cut down on processing overhead in the applications.

The first version of RPC Monitor debugs distributed applications that support Novell, Inc.'s Sequenced Packet Exchange protocol. A subsequent version for TCP/IP nets is being developed. Pricing for the software has not been determined, but Netwise expects it will cost between $10,000 and $12,000.

NETWORK WORLD

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Users demand net mgmt. tools

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That capability is particularly useful because it allows users to manage terminals dispersed across three campuses from a central point.

"It enables me to access any one of the IBM Terminal Adapters, check for the number and kind of errors, reconfigure them or check configurations, do loopback testing and send bit error rate tests back and forth," Fritz said. IBM's 7820 can also be managed from a NetView console.

IBM is apparently the only ISDN customer premises equipment vendor with a terminal adapter that supports both remote management and integration with enterprise management systems, according to users, vendors and analysts.

The latter is growing more important. "If you're going to start building a global or national ISDN utility, you're going to have to really get concerned about management," said Mary Johnston-Turner, a principal with Northeast Consulting Resources, Inc., a consulting firm in Boston.

Recognizing that, some ISDN customer premises equipment vendors are linking their products to integrated net management systems. Codex Corp., for example, plans to offer integrated network management for its recently introduced BRI terminal adapter ("Codex enters ISDN mart with BRI terminal adapter," *NW,* July 23).

With the initial release of Codex's 8860 ISDN BRI product, users can configure the adapter and perform diagnostics from a local or remote ASCII terminal.

The company said that in 1991, it plans to add support for the adapters from its 9800 Network Management System. Since the 9800 supports links to NetView and Codex plans to introduce links to AT&T's Unified Network Management Architecture as well as Digital Equipment Corp.'s Enterprise Management Architecture, users of those systems will also be able to manage 8860s.

> "If you're going to start building a global or national ISDN utility, you're going to have to really get concerned about management."
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Krause said integration with enterprise management systems such as NetView, which McDonald's uses, and support for standard protocols are both key considerations for users.

The widespread adoption of standards, such as those being developed in the OSI/NM Forum, will make compliance a necessity for ISDN customer premises equipment vendors, added Peter Bernstein, a senior analyst at Probe Research, Inc. in Cedar Knolls, N.J.

But users and analysts agreed that implementation of standards on ISDN gear will not take place for at least a few more years.

Some vendors, however, are offering varying levels of standards-based network management for different types of ISDN customer premises equipment. Microcom, Inc., for example, offers a bridge that links Ethernets over BRI lines and can be managed from a personal computer running Simple Network Management Protocol (SNMP) software. SNMP is the standard protocol for managing TCP/IP networks.

In general, however, customer premises equipment vendors have not announced support for net management standards. "If we're getting any management on the CPE side today, it's just a proprietary management system geared for that particular company's equipment," Johnston-Turner said.

Firm adds versions of NetWare

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General Corp. and Prime Computer, Inc., Haley said.

Interactive Ported NetWare can support an unlimited number of DOS, OS/2, Apple Computer, Inc. Macintosh or Unix clients but will probably be used primarily to support non-Unix computers. In a typical application, the Unix computer will function as a data base server, offering higher performance than a DOS-based NetWare server that executes only a single task at a time.

Interactive's Portable NetWare implementation supports the NetWare Virtual Terminal (NVT) protocol. DOS machines use NVT to perform ASCII terminal emulation, which they need to establish a session with a Unix workstation.

Interactive Ported NetWare can also work in conjunction with two other existing Interactive software packages, Interactive TCP/IP and Interactive NFS, which are Interactive's implementations of Transmission Control Protocol/Internet Protocol and Sun Microsystems, Inc.'s Network File System.

The TCP/IP package will enable any Unix hardware platform running TCP/IP to share files, applications and services with NetWare clients supported by a server running Interactive Portable NetWare. NFS support enables NetWare users to access NFS files on remote Unix computers through the Unix server running Interactive Portable NetWare.

The other new Portable NetWare release, Interactive Ported Client NetWare, runs on individual Unix workstations. It enables them to reside on DOS-based NetWare LANs and to use file and print services, as well as NetWare's Message Handling System E-mail capability, Haley said.

Interactive Ported Client NetWare works with an existing Interactive software package, called Interactive VP/ix, which translates Unix calls to DOS calls so that the Unix personal computer can run DOS applications. That software only supports a single task at a time.

The new Interactive Ported Client NetWare allows establishment of multiple sessions simultaneously over an Ethernet interface card in the Unix client, while the VP/ix software continues to translate DOS and Unix calls.

Interactive Ported NetWare and Interactive Ported Client NetWare should be available in November for Ethernet and token-ring LANs. They will cost $4,995 and $295, respectively.

Interactive also introduced Interactive SMB/ix, which enables users of IBM's PC LAN and compatible products that use the Server Message Block protocol to transparently access and share data, files and printers with systems running Interactive Unix. It is expected to be available in September for $895.

Firm shaves net expenses by 35%

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to serve as backups during the conversion process and will eventually be taken down once Towers Perrin is confident that everything is working well.

Donovan said network savings have come from integrating multiple 56K bit/sec local loop connections onto T-1 circuits and from the fact that Cable & Wireless' 56K bit/sec fractional T-1 services are far less expensive than AT&T's 56K bit/sec Dataphone Digital Service.

The local T-1 circuits, which are only about 25% more expensive than individual 56K bit/sec local links, also give Towers Perrin greater flexibility to increase network capacity.

"If we want to add another [interexchange] DS0, we just call up Cable & Wireless and we've got it in five days or less," she said. Circuits can be installed quickly because local carriers don't have to get involved in the provisioning process.

Donovan said one disadvantage to the fractional T-1 network is that it reduces network management capabilities. Currently, the network management system on the company's MainStreet T-1 multiplexers from Newbridge Networks, Inc. can only monitor local T-1 circuits.

She said the Newbridge network management system, like systems from other T-1 multiplexer makers, cannot monitor the fractional T-1 links. The monitoring capability of Newbridge's network management system stops at the digital access and cross-connect systems Cable & Wireless uses to split out individual fractional T-1 circuits.

Donovan added, however, that a new release of Newbridge's net management system is expected to improve fractional T-1 network management capabilities, although she is not sure what those improvements will be.

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As for the future, Donovan said, Towers Perrin is considering using Cable & Wireless' 56K bit/sec Fiberpoint leased-line service to carry traffic from 22 other offices directly to the Philadelphia data center. Currently, these offices access the data center via 9.6K bit/sec AT&T Dataphone Digital Service connections to the eight offices on the fractional T-1 network.

Donovan said Cable & Wireless' 56K bit/sec leased-line services would cost only about 10% more than the 9.6K bit/sec AT&T Dataphone Digital Service and would enable Towers Perrin to improve network response time to the 22 offices.

Another alternative being considered is to support these offices with switched digital data and fractional T-1 services from AT&T. Currently, she said, most of the firm's voice traffic is carried over an AT&T Software-Defined Network, which is accessed via T-1 links from private branch exchanges in company offices.

Donovan said Towers Perrin may stick Newbridge T-1 multiplexers in front of its PBXs, which would enable the firm to use some of the 56K bit/sec channels within the T-1 for voice and some for access to switched data at speeds up to 384K bit/sec or for access to AT&T fractional T-1 services.

Framing format provides data

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9,000 in 1994, an annual average growth rate of 38%.

But although several carriers offer T-3 service, few use C-bit parity, analysts say. AT&T is one of the few supporting C-bit parity. Dick Wells, a manager with AT&T's Network Services Division, said the carrier began offering Accunet T45 service in January 1986 and began deploying C-bit parity in its T45 offices a year later.

The carrier expects to support C-bit parity in the vast majority of its T45 offices by year end, Wells said. "We will continue to support M13 as long as there is demand for it," he said. "But we're encouraging customers to move to C-bit parity."

Users must buy T-3 multiplexers that support C-bit parity to take advantage of the capabilities it offers. Several vendors, such as Network Equipment Technologies, Inc. and Timeplex, Inc., only support M13 on their T-3 multiplexers.

But AT&T's Wells said vendors are starting to develop T-3 products that support C-bit parity. Newbridge Networks, Inc. offers C-bit parity support as an optional feature on its 3645 MainStreet Bandwidth Manager.

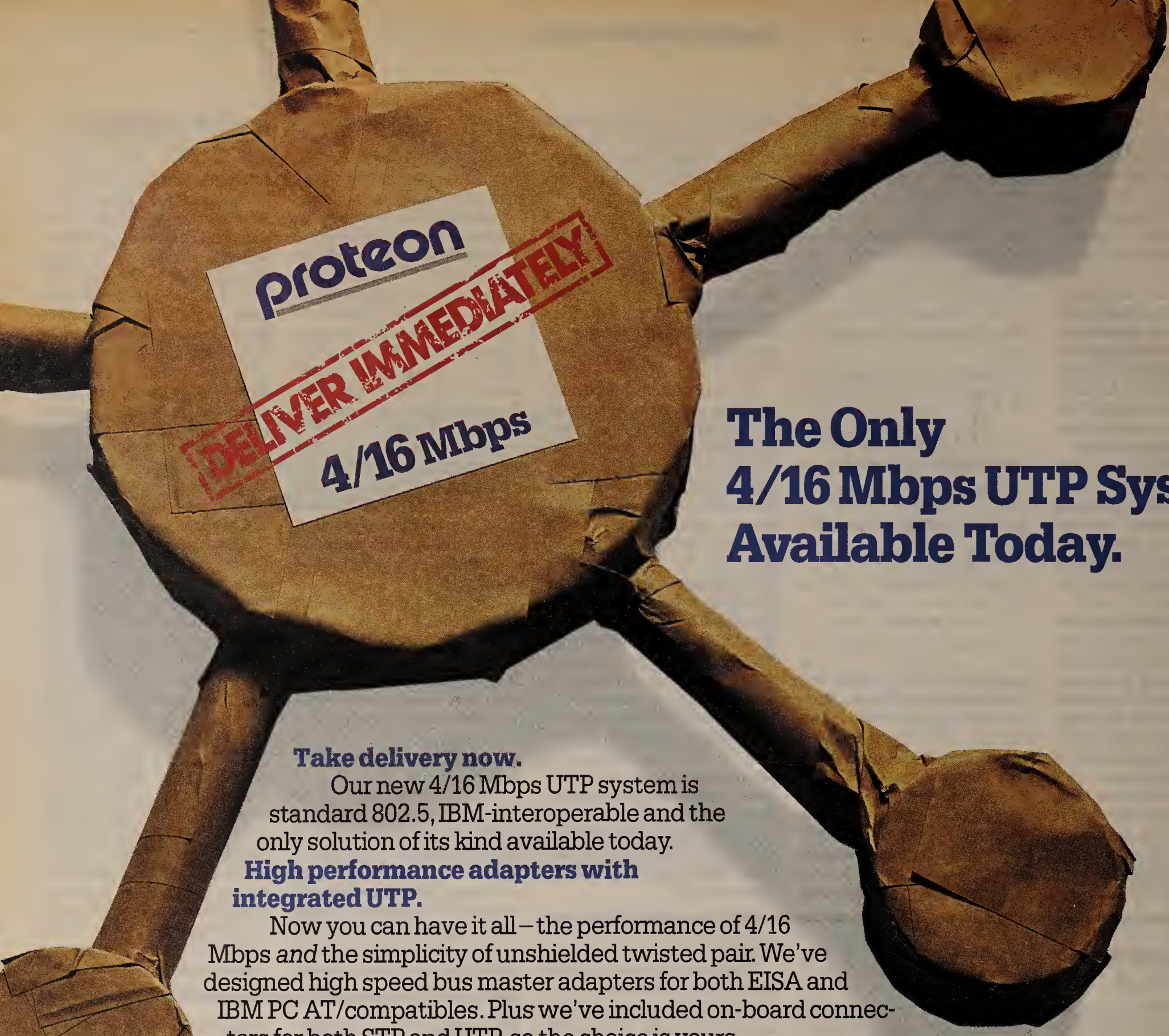
Bud Bates, principal with Technical Consulting, a consultancy with offices in Bala Cynwyd, Pa., and Phoenix, said users with M13 multiplexers will have to swap out software and add new interface cards to support C-bit parity to use the capabilities supported by the T-3 framing format.

A recent survey of 75 current and prospective T-3 customers revealed strong user interest in C-bit parity. Market Research, Inc. of Portland, conducted the survey for Kentrox Industries, Inc., a customer premises equipment manufacturer also in Portland.

Betsy Sharp, marketing director for Kentrox, said 65% of users surveyed ranked C-bit parity of high importance, 18% ranked it moderately high and 17% said C-bit parity was of low importance.

Joe Savage, vice-president of strategic planning and product management for Kentrox, said the vast majority of the current T-3 users surveyed use M13. "They complained about the lack of end-to-end performance monitoring and network management," he said.

Citibank, N.A., CSX Corp., Electronic Data Systems Corp., Liberty Mutual Insurance Co. and Merrill Lynch & Co., Inc. topped the list of firms that participated in the survey, Sharp said.



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